UNITED STATES ARMY

SEPTEMBER 1970

AVIATION DIGEST

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UNITED STATES ARMY AVIATION DIGEST

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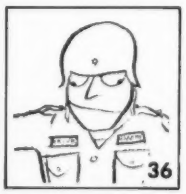

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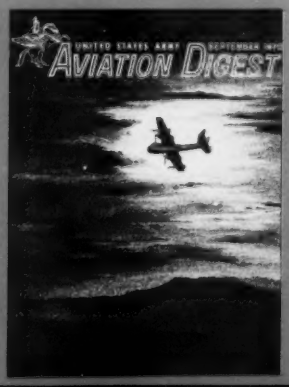

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

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Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, U. S. Army Aviation Digest, Fort Rucker, Ala. 36360.

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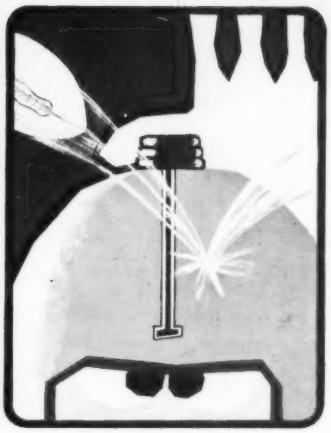
VIEWS FROM READERS



Sir:

I thoroughly enjoyed the exciting monthly winner "Milk Run" in the April 1970 AVIATION DIGEST by CW3 Jordan. As an aviator and having been involved in a similar "circumstantial trap" I can appreciate the confusion and terror the author so aptly describes.

One minor point which should be considered for correction is the reference to the audio signal which "almost burst their eardrums" when the rpm increased. According to the UH-1 operator's manual, chapter 2, the warning light and audio signal in combination operates only on low warning instead of both high and low rpm situations as indicated in the article.

I only mention this to eliminate the possibility of misleading the readers who may have doubts but will not check the dash 10 for confirmation.

CPT George W. Capehart
HQ, Sixth U. S. Army
Presidio of San Francisco,
Calif. 94129

• The Department of Maintenance Training, USAAVNS, Ft. Rucker, Ala., fielded this one for us and stated that CPT Capehart is correct—the audio signal and warning light operate only on low rpm.

Sir:

I have a question regarding your article on page 44 of the May DIGEST ("Computer Aviation Mishap Analysis System").

As a recent graduate of the USC Safety Course we discussed and were provided with an opportunity to see the new 2397 series forms. They appeared to me to be an excellent improvement over the old reporting system.

Question. When will these new forms be put into use.

1LT David S. Shriner
USAREUR AVN S&S Det
APO New York 09025

• The new forms were sent to appropriate Department of the Army agencies in April. They are being coordinated and staffed at DA level. If the priority requested is placed on this project, you may expect to see these forms and associated regulation changes in the field this fall.

Sir:

The April 1970 issue has several excellent articles dealing with instrument flight, instrument renewals and night vertigo problems. The monthly winner entitled "Milk Run" by CW3 Jordan has several good lessons. It was especially interesting as he states that the general's pilot in the story was an instrument examiner.

I feel that my first obligation as an instrument examiner is to set the example and assist others in staying out of trouble. If I neglect this responsibility, I am of no value to the Army as an examiner no matter how well I may fly instruments or how much weather time is in my 759 file. Granted, there are times when the regulations do not apply and you stick your neck out such as on ammo resupply or medevac—but not on a routine VIP mission. Then when it is necessary to take a risk involving weather, you do it only with the aircraft you are flying; don't suggest someone else follow you.

It looks as if the examiner violated several common sense rules in this case. First, he underestimated the fuel required. Then, he encouraged noninstrument rated aviators to follow him on top of a solid overcast. He failed to check destination weather enroute and select a suitable alternate in time. He advised another helicopter to fly formation on his aircraft in instrument flight conditions which is a no-no even when all parties are instrument rated. A better solution would have been for him to remain on top and relay GCA instructions to the other aircraft on FM until he was safely on the ground. He was not concerned about the situation even after landing. And, he was ready to lead these young troops back into the soup after they were safely on the ground!

If CW3 Jordan knows the name of the examiner involved, may I suggest he do the Army a favor and initiate action to revoke his examiner's status and maybe even flight status.

Our helicopter instrument qualification program continues to suffer from a lack of proper priority. We continue to see people return from flying UH-1s in RVN and find that they haven't had a hood on or even made a GCA since flight school. As CW3 Combs said in his article ["Inadvertent IFR," page 44], it only takes about 5 minutes at the end of a flight to make an instrument approach. The common retort is, "But we were flying 200 hours a month, etc."

When the appropriate commanders finally realize that instrument training doesn't cost, it pays—in life insurance for his aviators, materiel conservation and increased mission effectiveness—maybe some improvement can be seen. It is also up to the individual aviator to take some initiative and put forth some effort. Too many aviators are looking for an excuse for a waiver on instrument qualification instead of finding a way to maintain qualification.

CW3 Carl L. Hess
HHC, 55th Avn Bn (Cbt)
Ft. Hood, Tex. 76544

The DIGEST also received a letter from CW4 Alvin Lee, 17th Combat Aviation Group in the Republic of Vietnam, commenting on the excellent article entitled "Assignment: USAREUR" by Colonel Mertel and Captain Mitchell (May 70 issue). Nice to hear from you, Al. Keep those cards and letters coming, folks.—Editor

Hawk In The Sky

The OV-1A, B or C model Mohawk with its various sensor systems is the best equipped and most sophisticated reconnaissance aircraft in the Army's inventory. However, it does have its limitations which can be misinterpreted or not understood by those commanders it supports

Major James M. Boone

"SNEAKY PETE 99, this is Delta Hawk 3. I have a mover at coordinates XT 123456, over."

"Delta Hawk 3, this is Sneaky Pete 99. Would you describe the target, its direction of movement, speed, number and whether it's friendly or Charlie? Over."

"Sneaky Pete 99, I don't have that capability, over."

"O.K. Delta Hawk 3, this is Pete. Earlier tonight I saw a squad of VC walking past my position. Why didn't you warn me? Over."

"Sorry about that Pete. Next time you come down to your home base drop over and see us and we'll let you know how we can help you and show you why we couldn't see that squad of troops."

"All right, Delta Hawk, I'll be down to see you Monday. Put the coffee pot on."

"Will do, Sneaky Pete. Delta Hawk 3 departing your area for now—be back in about 45 minutes. Out."

This is a true radio conversation; only the call signs have been changed to protect the innocent, or guilty. The conversation was between an OV-1B Mohawk on a side looking airborne radar (SLAR) mission at night and a Special Forces outpost not too far from a well-known border area.

Do you know why the SLAR ship was there, the significance of the "mover" he spotted and why he couldn't answer all the questions that were asked? OV-1 Mohawks have been operating in the Republic of Vietnam for quite some time, from the tip of Ca Mau to the DMZ both day and night and in the middle of some "raunchy" weather. Yet many personnel, including Army aviators, don't know just what these OV-1s can and are doing for the war effort.

The general lack of knowledge of the OV-1 units and sensor systems can be traced to the classified nature of both during their initial introduction in Vietnam. However, much nontechnical information concerning these operations has been declassified and can be discussed.

Let's start with a thumbnail sketch of the history of surveillance. Prior to the Civil War surveillance was confined to eyeball observation by the front-line soldier. This type surveillance had certain limitations caused by weather, darkness, visibility and the human factor of reliability. During the Civil War surveillance was accomplished by an observer sent aloft in a balloon. This placed the observer in a very precarious position but it extended the surveillance range and improved visibility slightly. Nevertheless, there still were critical limitations due to weather, darkness, visibility and reliability.

The introduction of the airplane in World War I provided a greater capability to observe the enemy. For the first time a commander could select and change the surveillance area, and mobility was no longer considered a limiting factor. Further improvements were made in World War II with the introduction of the aerial camera. This equipment helped to overcome the limitations of human reliability to a degree and provided the commander with a fixed imagery to study. The only limiting factors remaining were weather and darkness. There were no further major advances in the surveillance field through the Korean War. In the late 1950s radar equipment was developed that could detect moving targets and infrared equipment was developed that could detect infrared rays.

Since 1960 virtually all of the earlier limiting factors have been eliminated and the capability exists to conduct sustained, near all-weather, day and night, visual, photographic and electronic surveillance of the battle area. Additionally, capabilities are increasing so rapidly that a thorough initial understanding, as well as a periodic updating of the art, is

Hawk In The Sky

necessary. This is where the problem begins. Even aviators with an understanding of the surveillance capability are not normally flying OV-1s or in a position to be updated on new developments. Still, nonrated personnel consider any Army aviator from W-1 to general officer as an expert in all aspects of the Army flying business. But, how many are qualified to advise a ground commander on the most efficient way to use the surveillance aircraft and sensors available to support him? Few are. The answer is to educate personnel who are in a position to influence the mission assigned the surveillance airplane company.

Let's look at the company mission, some organization information and a layman's explanation of the sensor systems.

The surveillance airplane company is organized to provide combat surveillance and reconnaissance capabilities normally to a corps or division, if requested, through the use of OV-1 Mohawks equipped with infrared, side looking airborne radar, day and night camera systems and ground data stations. In short, the unit has the necessary experts and equipment to collect, interpret and disseminate information gained from aerial imagery. The unit normally is under the operational control of the corps G-2 air even though assigned to an aviation battalion. Mission requests are funneled through the intelligence channels to the corps G-2 air. This sounds like a lot of distance to travel with many headquarters to go through, but the unit prides itself in being immediately responsive to the ground commanders' desires. A misunderstanding of the sensor capabilities could cause unnecessary delays in mission accomplishment.

The unit is tailored to provide sustained, near all-weather, day or night surveillance of the entire corps area by using visual, photographic, side looking airborne radar and infrared systems. The imagery produced by the systems is processed and interpreted with the information disseminated to units by radio, telephone and teletype.

Sounds great, but let's be realistic and mention a few of the unit's limitations. No matter what anyone says the OV-1 used in its intended role in Vietnam is not a short field aircraft. When mission-ready it must be operated from improved airfields because of high gross weights and the sensitivity of the sensor systems to the abuse of dirt or makeshift runways. Ideally, the unit operates from a fully instrumented airfield to take advantage of its IFR capabilities. The unit also is dependent upon higher headquarters to provide administrative and logistical support.

Command and control aircraft are not provided by the TOE, nor is an OV-1 with dual controls for standardization and orientation of new aviators. Most units in Vietnam have acquired a dual control ship by removing the infrared sensor from an OV-1C and installing dual controls or by assignment of a dual control aircraft above TOE authorization. Commanders also should realize that a surveillance airplane company contains by TOE 18 OV-1s and over 140 pieces of rolling stock varying from a one-quarter ton trailer to a semivan. This is not a small outfit—a fact that becomes quite apparent when trying to find a place to park on a tactical airfield.

The company is organized with a company headquarters, operations platoon, surveillance platoon, signal platoon and a services platoon. For the most part this organization looks familiar with the exception of the surveillance platoon.

The company headquarters has the normal command and control element but differs in the mess and vehicle maintenance areas. The mess hall must provide meals on a 24-hour basis because the unit normally flies operational missions throughout the night, while maintenance generally is performed during daylight hours. The motor pool provides maintenance for a multitude of power generators as well as vehicles and trailers. The mess and motor maintenance requirements rival that of a normal battalion.

The operations platoon is the hub of activity for the company as in any aviation unit. However, major differences exist in the surveillance airplane company operations platoon. In addition to normal flight operations scheduling, this platoon has an imagery interpretation section assigned to extract and disseminate information from the imagery produced by the aircraft sensors. This task requires highly trained intelligence specialists to extract information from photographic infrared and SLAR imagery. The section has the necessary military intelligence corps officers and enlisted men assigned to man two tactical imagery interpretation facilities in 12-hour shifts. Imagery is reported in either mission reports (30 minutes), hot imagery reports (1 hour), immediate imagery interpretation reports (4 hours) or detailed interpretation reports when requested by the supported unit. The importance of this section lies in the fact that the imagery interpretation experts will provide the supported unit with information rather than imagery that must be analyzed by untrained personnel.

The signal platoon is a large organization in that it must provide personnel and equipment to:

- establish radio and wire nets

Trained observer reads a SLAR map during a flight of an OV-1B aircraft

• provide organizational maintenance for all avionics, SLAR, infrared and aerial cameras

• process all exposed imagery. This platoon also must operate on a 24-hour basis. Much of the sensor test equipment and all exposed imagery is classified, making security of utmost importance.

The service platoon schedules and supervises aircraft maintenance and provides refueling and crash rescue services for the company. Maintaining efficient aircraft maintenance within this unit is extremely difficult because of the complicated machinery involved. The OV-1 is not a simple aircraft.

The surveillance platoon is responsible for the conduct of the mission and has the necessary aircraft, aviators, crew chiefs and sensor operators to accomplish the collection of information and imagery. To understand how the platoon performs its mission requires a knowledge of the equipment with which it works.

Let's begin with the aircraft. The OV-1 is a highly sophisticated aircraft powered by two Lycoming 1,100 shaft horsepower (SHP) engines driving Hamilton Standard fully reversible props. Normal cruise air speed is about 220 mph. The Mohawk also has two Martin-Baker ejection seats capable of getting the pilot and observer from the aircraft to suspension in a fully inflated parachute in 7 seconds with an initial force of 19 g's. The normal station time of the aircraft with external fuel tanks is about 3 hours and the cockpit instrumentation is such that IFR flying becomes a pleasure. (The auto pilot sure helps here.) The aircraft has been manufactured in three different models with a fourth expected off the production line in the near future.

The OV-1A was first off the production line in 1960. It had 950 SHP engines, dual controls and a built-in KS-61 camera system (a KA-60 panoramic camera was added later). It was used primarily for transition training, visual and photographic reconnaissance and surveillance missions.

The KS-61 camera system employs the KA-30 camera that can be positioned in flight to provide vertical (with 20 to 80 percent forward overlap) or 15 and 30 degree oblique photos. The system can be used at night with a strobe unit (240 prints) or photo flash cartridges (101 prints). A word of warning: the photo flash cartridges sound exactly like incoming mortar rounds when fired within about 1 mile of your position. This camera system has a limited area

Hawk In The Sky

coverage; therefore, it is best utilized for spot photography, strip mosaics or small area mosaics. The KA-60 panoramic camera installed on the OV-1A and OV-1C is fixed-mounted in the nose of the aircraft and provides a horizon-to-horizon photographic capability specifically designed for high-speed, low-flying aircraft. This camera is especially valuable for taking photographs of helicopter landing zones from the planned helicopter flight approach path.

The OV-1B is equipped with the AN/APS-94 side looking airborne radar system. It is easily identified by the black radar antenna slung beneath the fuselage and extending beyond the nose of the aircraft. The SLAR system simultaneously produces both fixed (permanent echo (PE)) and moving target indications (MTI) presentations on film in the cockpit of the aircraft. The SLAR is an active system that transmits a radar beam which is reflected back to the aircraft and is capable of detecting slowly moving objects within certain surface reflection limitations (personnel usually do not provide an adequately reflective surface). The PE mode of operation produces a radar map of the terrain and displays fixed target information (FTI) and the MTI mode records moving target information.

The range of the SLAR system makes it ideal to use in the continuous surveillance of large areas such as coasts or borders.

The sensor operator can select from a variety of ranges on either the right or left side of the flight path or both simultaneously.

The heart of the SLAR system is a rapid data processor located in the cockpit. It rapidly processes film exposed by the radar and the processed imagery passes across a lighted viewing screen allowing the sensor operator to transpose the viewed targets to a tactical map. A well-trained and experienced operator can plot a moving target and rapidly transmit an in-flight spot report after viewing the imagery.

This rapid transmission of target data combined with the fact that the system operates in day or night and in poor weather conditions makes it an extremely valuable information collection device. The effectiveness of the system is limited in extreme weather conditions (heavy rain, sleet, etc.) and is vulnerable to electronic countermeasures. However, there are few encounters with either of these two limiting factors.

The SLAR system also can transmit signals from the system to a ground station that has equipment almost identical to that in the aircraft.

The system does have significant limitations such as:

- The SLAR imagery reveals friendly targets with the same targets with the same degree of "truth" as it does enemy targets.
- Extreme weather conditions will degrade the quality of the imagery produced.
- The system is subject to radar jamming and radar masking when working in mountainous terrain. Proper mission planning will overcome these limitations to a certain degree.

The second surveillance system found in the surveillance airplane company is the AN/UAS-4 infrared system installed in the OV-1C. The infrared (ir) system is a completely passive system that detects the heat differential between objects. All objects with temperatures above absolute zero (-273 degrees C.) radiate some electromagnetic energy.

The amount of energy in the form of radiated heat is determined by the ability of the object to radiate and its temperature. The infrared system detects even minute differences in the emitted radiation of objects close to each other, thereby differentiating between them. Enough on infrared theory. The ir system employed in the Mohawk scans the terrain directly beneath the aircraft and senses the radiated temperature variations between the terrain and objects on the terrain. This variation is changed to an electrical impulse that exposes photographic film to make a permanent imagery record.

The ir aircraft are equipped for a real time pictorial display of the ir returns as the aircraft is passing over the terrain. The ability to detect a target and plot its exact location while in flight with the present system is almost impossible. Later models of ir systems may improve this capability somewhat. The ir system will operate in day or night but is most effectively employed at night as the natural cooling of the ground permits a larger heat emission differential between objects and the terrain.

The infrared system is not an area surveillance device because it scans directly beneath the flight path of the aircraft and has operational altitude limitations. Therefore, the system is generally employed to provide coverage of routes, small areas and suspected enemy locations or installations. All information received by the airborne infrared sensors can be simultaneously transmitted to a ground sensor terminal that contains identical display and recording equipment to that in the aircraft. The range is limited by line-of-sight transmission.

The ir system is not operable in all types of weather since it can not receive heat emissions through cloud layers, dense jungle or other

Specialists develop film taken on an OV-1 Mohawk flight

similar heat-absorbing environments. Operations in mountainous areas is less effective than in flat terrain because of the necessity to fly at higher altitudes at night.

There are definite limitations to the ir system but some of these will be overcome with newer versions. The primary limitations are:

- Target identification—like the SLAR, the infrared will acquire friendly or neutral indicators with the same degree of truth as it reports enemy indicators.
- The aircraft must fly directly over the target area at a relatively low altitude (has been known to cause premature greying of pilot's hair in RVN).
- It will not penetrate weather or foliage.
- The exposed imagery must be processed in a photo lab, thereby causing delay in acquiring mission results.
- The small area coverage restricts the system to point, linear or small area targets.

By now you are almost an expert on the surveillance airplane company organization and equipment. Further explanations or details would infringe upon classified information; therefore, we have reached the stopping point. However, keep in mind that TOEs are continually changing and improved systems are being developed. Even the name of the unit will probably change.

The OV-1s with their installed equipment have provided invaluable intelligence information for analysis by the experts in Vietnam. As combat experience is gained and with the addition of newer and more advanced systems, the units' capabilities will continue to improve.

You can do your part as an Army aviator by staying abreast of the latest innovations in this field and by helping to see that these systems are properly utilized by the ground unit commanders.

Maintenance

Did You Know? It should be kept in mind that the nuts on the fireshield band and tailpipe band on all UH-1 aircraft cannot be reused. When a hot end inspection is due, new ones should already be in stock to ensure that no downtime is incurred while awaiting parts.

Don't Mix Old And New Oil: All units using oil 23699, which replaced the old 7808 oil, should check their stock to ensure that the 7808 oil is not mixed with the 23699 oil.

An OH-23 Tip: During alignment of the cooling fan gearbox on the OH-23 aircraft, utilize notched washers or split shims to slip behind the gearbox during the alignment phase. After alignment has been completed and checked, replace with whole shims or washers. This saves removing the entire gearbox after each adjustment is made to add or subtract washers.

Shim It Up: Be sure to use the proper amount of shims on the tail rotor delta hinge bolts on the OH-13E and G aircraft. If there are not enough washers installed, it will cause stiffness in the directional controls.

Hydraulics: One of the greatest problem areas in aircraft maintenance is hydraulics systems. Always check plumbing and fittings for security, damage and leaks. If any tubing needs replacement, use the old hydraulic line as a template in order to obtain the proper length and bends for the new line. To ensure a good flared tubing connection, the tubing should be cut squarely and the ends deburred before it is flared. If a tubing cutter is not available, a hacksaw with a 32 teeth-per-inch blade may be used. A fine, flat file may be used to file end of tubing square. Remove all filings, chips and grit from inside and outside of the tube. Inspect tubing ends to see if tube is round and free from draw marks and scratches. Draw marks or scratches are likely to spread and split the tubing when it is flared. Next, install the proper nut and fitting sleeve. Then position the flaring tool on tube tightening the wedge only ¼ to ½ turn at a time, then release the pressure. This allows for stretch of the metal. If the completed flare is of proper size and coverage then flare the other end of tube. Before the tubing assembly is installed, it should be carefully inspected. The tubing should also be clean and free from all foreign matter. When the completed fixture is installed, the fitting nuts should be screwed to mating fitting by hand and tightened to recommended torque with proper wrench. Tubing should not be pulled into place with the nut but be properly aligned prior to tightening. Pliers should never be used to tighten fittings. It is important that fittings be properly torqued.

Safetywiring: The first and most important tip for safetywiring any bolts, screws, nuts, etc., is to be certain the parts to be secured are properly torqued. Next, be sure the proper size and type wire is used. Also, use the proper length of wire in order to completely cover the work. Exercise caution when using pliers while working with safetywire to avoid kinking or scratching the wire. Use pliers only on the ends of the wire; this will help avoid damaging the wire. Always cover the wire to be cut to avoid eye injuries. Follow these tips and use TM 55-405-3.

A Cover Idea For The CH-54: By making a sheet metal cover to go on top of your rotor brake package you prevent rain and water from entering through the top vent screen of the sight gauge and mixing with the hydraulic fluid. By

Matters...

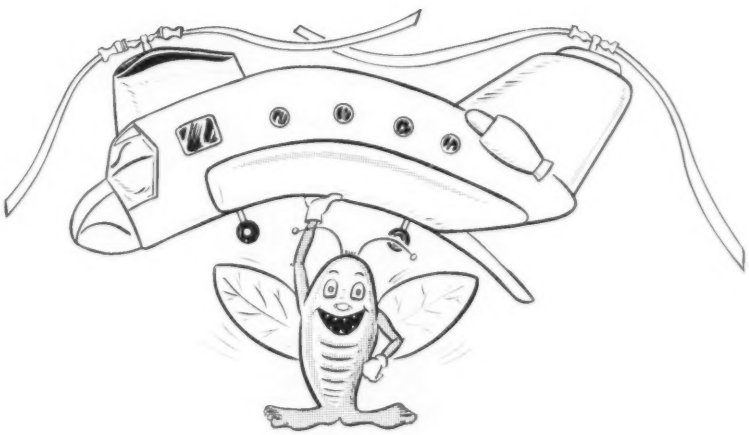
...Does That Bug You?

doing this you may avoid having contaminated fluid and save an unnecessary bleeding of the system.

Too Much Oil: Has the intermediate gear box on your CH-37 been throwing out oil? The cause may be from an overfull condition. On this gear box the oil forms an arc in the sight gauge. When the outer tips of the arc are even with the full line, you are in good shape. If the center portion is on the full line, the gear box is overfull and may throw out the excess. Make sure you remove the felt pad from the filter spout before servicing!

Prevention Of Deterioration: When finished bleeding brakes, make sure your tires are wiped clean of all hydraulic fluid. This will help prevent their deterioration.

Using Protective Blocks: When working on top of the OH-58A cabin, be sure to use your cowling mounting flange protective blocks. These blocks are made to protect the cowling mounting flange on your cabin roof from big-footed people. So, unless you're like Tiny Tim and can tippytoe, use those protective blocks and always have a good fitting cowling.

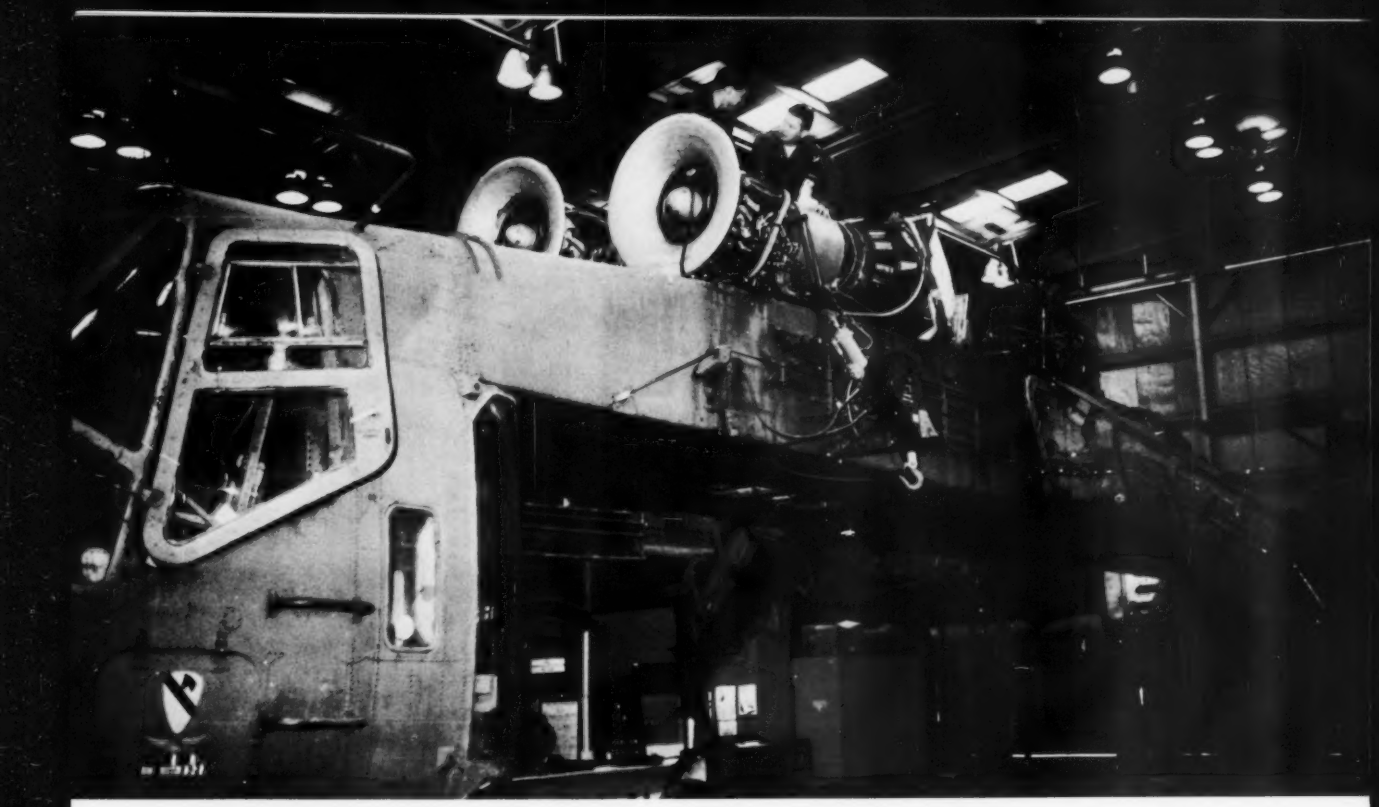


UH-1D and H Recovery: Many Army aviators will be involved in evacuating or retrieving downed UH-1s at one time or another. When retrieving a UH-1 with the rotor intact, the maximum download when securing the blade tips is 395 pounds. Deflection of the blade tip is limited to 53 inches below the flapping axis. Don't damage the UH-1 further by improperly securing the blades.

Changes Posted? Anytime you use a maintenance manual, check to see if there are any unposted changes in the front of the manual.

Cleaning Filters: When cleaning oil filters with solvent prior to reinstallation ensure that all solvent is off the filters because the solvent will break down the oil base.

Securing Aircraft Cowling: Never leave the work area without securing aircraft cowling. This will help reduce unnecessary maintenance problems.



Aviation Maintenance Training At

Fort Eustis

The U. S. Army Transportation School at Ft. Eustis, Va., provides up-to-date individualized aviation maintenance training for American as well as foreign armed forces personnel

Clementine R. Bowman

ONE OF THE MOST important objectives of the U. S. Army Transportation School, Ft. Eustis, Va., is to present an up-to-date aviation maintenance training program for personnel from all components of the Department of Defense and foreign military personnel. This is accomplished through the Aviation Maintenance Training Department of the Transportation School.

The department maintains 42 programs of instruction. Currently 38 are being taught, of which 27 train soldiers in the particular type of maintenance they will perform in their military occupational specialty (MOS). Fifteen of the courses provide special training on related equipment such as the Martin-Baker ejection seat which is installed on the OV-1 Mohawk.

The range of subject matter extends from basic subjects taught to aircraft mechanic apprentices to complex maintenance test flight procedures taught to experienced Army aviators. Intermediate levels of instruction include training for aircraft crew chiefs, enlisted maintenance supervisors and aviation maintenance officers.

Revision of the courses is based on a critical evaluation of skills and knowledges required for the best performance in the field. Curriculum content and subject matter presentation is determined by a variety of source materials such as the Manual of Enlisted Occupational Specialties, aircraft technical manuals, Army field manuals, reports from overseas activities, aircraft accident summaries and advice from overseas returnees.

The department's workload con-

Individualized training is given on the Army's CH-54 Tarhe, at left, and on the OH-58 Kiowa, at right

sists primarily of instructing enlisted men. The total student input scheduled for fiscal year 1970 is about 27,000 which is more than 60 percent of the total student input scheduled for the Transportation School for the year.

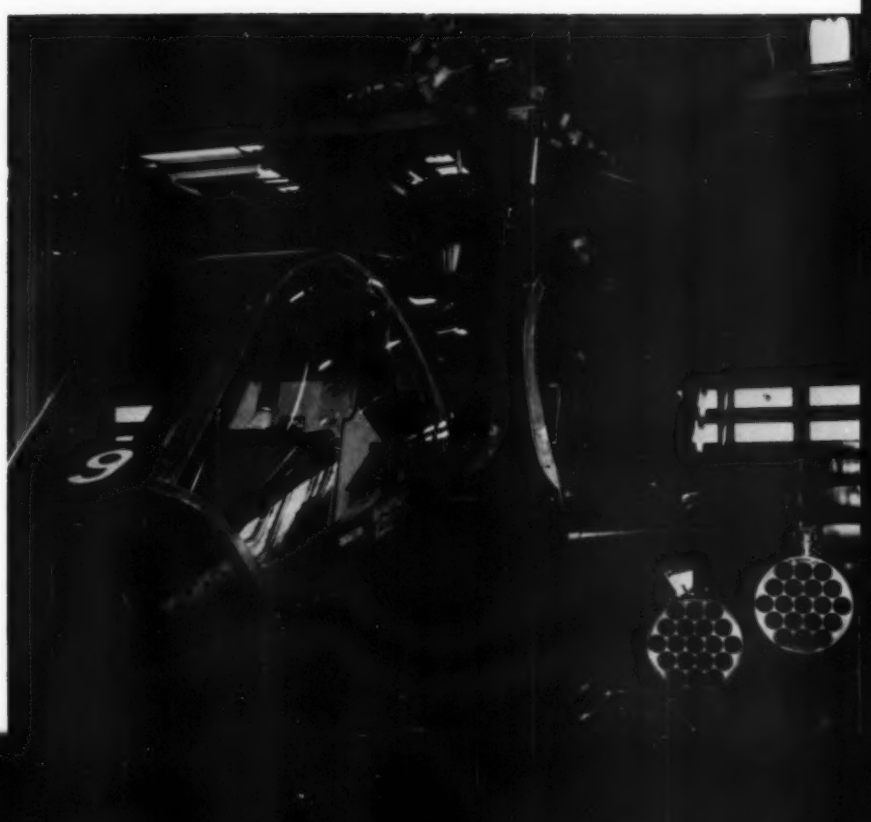
Most of the students come from basic training centers; however, those enrolled in courses above the journeyman level must meet stringent experience and formal training prerequisites. Officer student ranks range from second lieutenant to lieutenant colonel.

Instruction in the basic aviation maintenance courses is characterized by practical shop training, demonstrations and laboratory exercises. For example, a student may be required to repair bullet hole damage in the frame of an aircraft using sheet metal and riveting techniques. Or, he may have to tear down and reassemble an engine.

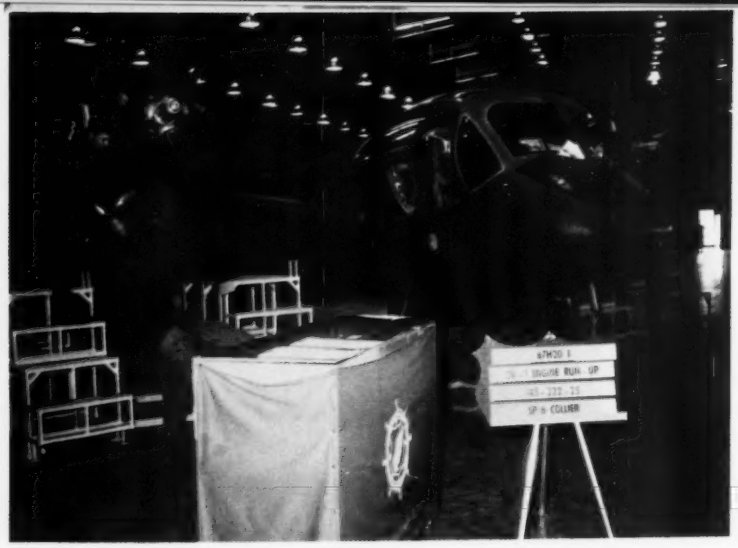
The intermediate levels of training integrate the accomplishment of maintenance tasks with the teaching of physical principles, operational theory, diagnostic techniques and preventive maintenance. Higher levels of training include aviation maintenance shop supervision and aviation systems management.

To conduct this training, Colonel Garrison J. Boyle III, has organized his Aviation Maintenance Training Department into two staff elements and six academic divisions. Ten large shop buildings, three hangars, about 70 classrooms and 164 aircraft of about 17 different types are utilized to facilitate this training.

Included in the 17 different types of aircraft are some of the Army's newest aircraft upon which students are required to perform different types of maintenance and repair. The department has the CH-54 Tarhe, a heavy lift helicopter capable of carrying a 10-ton payload. This is the largest helicopter in the free world. The CH-47 Chinook, a medium transport helicopter which can transport a full rifle platoon of 33 combat-



Students work on an Army AH-1G HueyCobra



Groups of students, working in teams, learn about the OV-1 Mohawk, above, and an OH-6 Cayuse, below

Below, students inspect a U-21 engine under the scrutiny of a maintenance instructor

equipped troops, is also utilized in the program.

Other aircraft are the AH-1G HueyCobra, the Army's newest armed helicopter; the OH-58A Kiowa, the newest observation helicopter; and the OH-6A Cayuse light observation helicopter.

Two of the fixed wing aircraft on which the students are trained are the OV-1 Mohawk and the U-21A Ute.

Because the department staff and faculty numbers more than 2,000, it enables the department to provide personalized instruction with attention to individual differences and student attitude. In keeping with this principle the Aviation Maintenance Training Department has introduced a new training mode which reduces class size to 6 to 12 students for selected courses. Student counselors are also assigned to each class in session to assist in resolving academic and personal problems.

Evaluation of student progress is continuous throughout the course. A student's ability is measured through written examinations, specific performance tests and daily grades assigned by the instructor during periods of practical exercises. This plan tests both the student's knowledge and his ability to perform.

The final evaluation is based on student performance in a realistic situation where he must accurately demonstrate the ability to perform a series of maintenance functions in a timely manner on aircraft and components.

The instructor force consists of experienced aviation maintenance enlisted men, warrant officers, commissioned officers and civilians. A majority of the military instructors have spent 2 years of duty in the Republic of Vietnam and have approximately 8 to 10 years of Army service, including at least 6 years of aviation maintenance experience.

Retired Aviators READ . . .

POTPOURRI

A 4-WEEK COURSE in rotary wing familiarization has been added to the residency in aerospace medicine specialty at Ft. Rucker, Ala., representing a milestone in the comprehensive training of flight surgeons.

The first two doctors to receive this 28-hour segment of flight training were Lieutenant Colonel Tomas Birriel-Carmona of Rio Piedros, Puerto Rico, and Major John P. Heilman of Butler, Pa.

Basic flight orientation in the OH-13 and UH-1 helicopters, instruction in instrument flying in the TH-13T rotary wing aircraft and complementing academic work are included in the 4-week course. Students also participate in some tactical missions involving helicopter gunships.

The completion of the study, according to officials at the Department of Aeromedical Education and Training, U. S. Army Aviation School, Ft. Rucker, enhances a flight surgeon's ability to evaluate pilots who have sustained physical disability. Such evaluation determines if the pilots are capable of flying without compromising safety, and its importance is seen in the fact that 75 percent of the pilots so evaluated are returned to restricted flying duty.

Flight surgeons are also concerned with the way the pilot's sense of balance is affected by rotary wing flight and the effect that gases and vapors from gunnery systems has on him. Too, they deal with the reaction of the human body to the helicopter's noise and vibration, as well as to equipment that is improperly designed to suit human functions or capabilities.

To deal with these issues competently, the doctors need a thorough knowledge of the mechanics of flight. The rotary wing familiarization portion of phase 3 is designed to meet this requirement.

Overheard in operations the other day . . .

Young aviator: "I'm returning to Camp Faraway this morning in a U-6" [weather 1,300 feet overcast, rainshowers forecast enroute, no copilot, distance — several hundred miles. — Editor]. "Can you tell me how the transponder works? They had trouble picking me up yesterday."

This is standardization?
This is supervision?
This is Army aviation?

The 355th Aviation Company (Heavy Helicopter) and the 662d Transportation Company recently received the Meritorious Unit Citation during ceremonies in the Republic of Vietnam.

The award recognizes the contribution of the company and the attached detachment to the allied effort in Vietnam during the period 13 January 1968 to 12 January 1969. The award specifically cites the unit's "extraordinary initiative and technical skill" in supporting ground forces in the II Corps Tactical Zone and their "responsiveness to the urgent demands of field commanders."

The citation further notes the units' safety records of over 2,700 accident-free hours and their exacting standards of maintenance and repair. The units transported over 13,000 tons of critically needed combat materiels during the period for which they received the citation.

Flight B-9 is the first flight at the U. S. Army Primary Helicopter School, Ft. Wolters, Tex., to accumulate 50,000 hours of accident-free flying. Brigadier General Robert N. Mackinnon, commandant of the Helicopter School, presented the award to Captain Billy G. Chapman, B-9 commander, and to the members of the flight. The record, which began 1 November 1966, is yet to be equaled at the school. The 50,000th hour was logged 15 March. The instructor pilots of this flight trained approximately 800 students during this 3-year period, and none had an accident.

INSTRUMENT
FLYING

in the AMERICAL DIVISION

Captain Philip G. Carthage

Instrument flight proficiency in a combat zone is sometimes difficult to maintain and instrument flight conditions are not always possible to avoid. When exposure to IFR conditions is low, inexperienced and seasoned aviators may appear apprehensive. Consider the following solution

THE MONSOON season in the Republic of Vietnam usually creates avid interest in instrument proficiency. The visibility and ceiling drop to marginal conditions—and for several days at a time it deteriorates to the point where no aircraft dare be moved.

This problem coupled with the relative instrument flight inexperience of newly assigned aviators prompted the Americal Division to establish an instrument training program to train unit instrument instruction pilots.

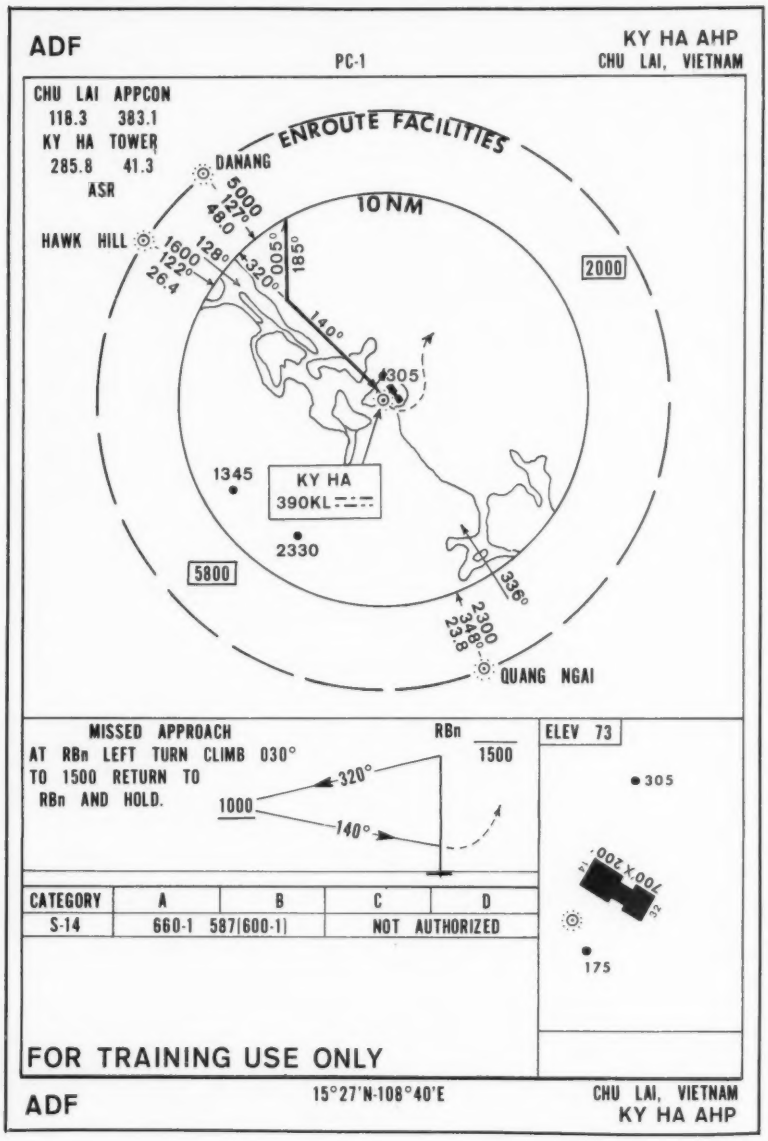
A solution in the Americal Division has been to initiate a formal course of instruction to train instrument instructor pilots (IPs). To support the program priorities, mission requirements and availability of aircraft were taken into consideration with the following result: one UH-1H was placed on a priority mission for 6 hours, 6 days a week and one instructor pilot was drawn from group level [16th Aviation Group (Combat)] possessing the requisite experience. In this case he was an instrument flight examiner with 2 years experience as an instrument instructor. Since two battalions exist within group, students were selected on a rotating basis from companies, one per battalion, for a total of two per class.

The long range objective of this program is to provide each unit (company level) with two instrument IPs performing short periods of hood training as the instructors rotate between missions. In this way unit instrument proficiency can be improved without interfering with the mission.

Group policy requires 2 hours of hooded flight and at least two ground controlled approaches (GCAs) every 3 months. Again we find that training the instructors in talkdown GCAs relieves the necessity of using and loading an approach control facility with traffic. It has also been found advantageous to check the instrument flight proficiency of potential aircraft commanders prior to issuing orders; this again is a function of the instrument IP. One other asset discovered in the program is the ability of these instrument IPs to concentrate on training individuals for renewal of tactical tickets prior to reaching an instrument flight examiner. The advantages of renewal are twofold: relief of pressure on CONUS created by returning aviators with expired cards; and adding to the division's assets by having available aviators competent in instrument flight.

What is the composition of the course? The base is a 2-week concentrated program consisting of ground school in the morning and 1 hour and 45 minutes of flight time per student in the afternoon. In this short period of time it becomes necessary to abbreviate some instruction and emphasize other portions that have more practical application.

The first 7 hours of flight time are devoted to refreshing student proficiency while flying right seat under the hood. The maneuvers include all those normally found in the U. S. Army Aviation School, Ft. Rucker, Ala., syllabus with emphasis placed on the following: unusual attitude recoveries, straight



and level, climbs and descents, level turns—all on both full and partial panel. Additional items in advanced instruments are touched on briefly: automatic direction finder (ADF) track interception, tracking and approaches. The single most important item that is stressed in the advanced instrument maneuvers is the GCA due to its availability within the area of operations and the ease of performance on the part of the aviator. The remaining 14 hours of flight training are devoted to methods of instruction (MOI). Flying from the left seat, the student instructor concentrates on the basic maneuvers, instruction techniques and performing demonstrations. During the last week the student devotes considerable time to giving talkdown GCAs and unusual attitude recoveries.

Ground school has been found to be the single most important factor in the rapid acceleration of the course. The advantage lies in the fact that the same instructor teaches both ground school and flight instruction, maintaining continuity throughout the course. Four hours each day usually suffice, with 2 hours devoted to conference instruction, 1 hour to programed texts and the last hour to review and preflight instruction for the afternoon flight period.

A technique was developed to stimulate the student's facility in presenting a verbal description of the maneuvers. One man is asked to orally describe the maneuver and a second is designated to critique. Using this conference system, about seven manuevers can be reviewed in a 1-hour period. These maneuvers are then covered in the afternoon flight period. The optimum number of students that one instructor can handle appears to be about four. More students decrease the degree of participation and cause a loss of interest, while fewer reduce spontaneous participation. Also helpful is the use of daily questions which require student research and familiarity with source material. Questions may vary from the practical, *Who do you call at Chu Lai for weather?* to the more standard, *What are helicopter takeoff minimums for aviators with a standard instrument rating?*

Lacking some of the polish found in surroundings like those at the U. S. Army Aviation School, it was decided to make use of resident experts to lend a more professional atmosphere. The noncommissioned officer in charge from the U. S. Marine Air Traffic Control Unit (67) at Chu Lai was invited to speak about radar and air

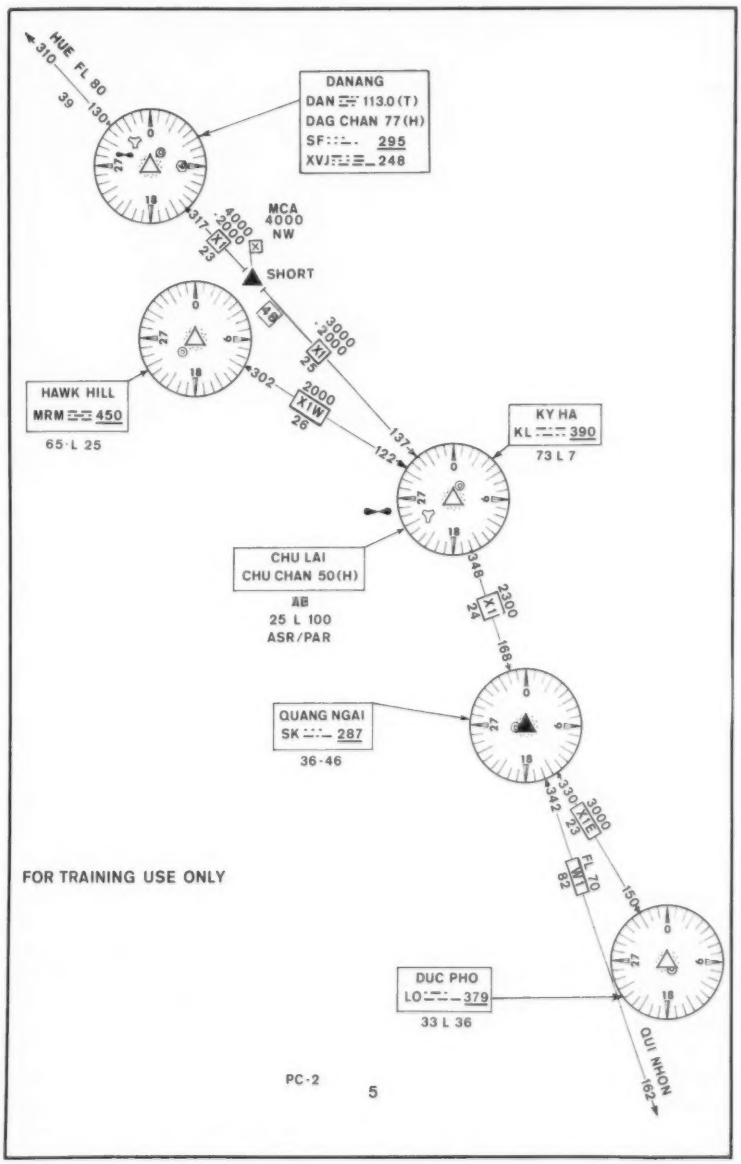
traffic control (ATC) procedures during the first course and thereafter became a permanent lecturer. The 16th Aviation Group flight surgeon, a qualified psychiatrist, donates 2 hours to each course, giving an excellent discussion of student motivation, impediments to learning and the instructor-student relationship. Since the last period in ground school is intended as a seminar, it was decided to request one of the more experienced instrument flight examiners to conduct the instruction. This also has worked well.

Another area—the problems of training in a small, reasonably secure location—necessitated the adoption of a solution similar to the one used at the Aviation School: the creation of an artificial enroute structure. It was relatively easy to implement such a system using available radio beacons. The problem area lay, however, in negotiating a letter of agreement with the ATC agency controlling the airspace in the area of operations, particularly at Chu Lai. This necessitated detailed coordination for the use of low frequency radio beacons in airspace containing heavy Air Force and Marine traffic, a problem area which should be considered before implementing any similar type program.

The availability of ADF approaches that were not saturated with high speed traffic created another problem. This was solved again by emulating the Aviation School. The example of Ky Ha (see figures) shows what can be done with a little ingenuity and a duplicating machine. Continuing development of approach plates and additions to the radio beacons for the enroute structure are planned.

One comment might be made on the surprising interest aroused by the program among the division's units—there were more applicants than could be handled. During the second class another system was adopted to enlarge student enrollment. Two more students were added to the ground school portion while their flight training was conducted by an instrument flight examiner from their unit—a CH-47 assault support helicopter company. Other methods of increasing input have been suggested; one variation is the use of class students as guinea pigs for the preceding class during its MOI phase.

A program of this variety will in the final analysis depend on the capabilities of the aviators we train. However, it is a significant innovation and its benefits will be evident when the monsoon season returns.



ASLEEP AT THE CONTROLS

Provided by the Society o

To the crewman: It was an average morning in the aviation medicine clinic. Five cases of upper respiratory infection. Two minor ear blocks without complications. An assortment of other aches, pains, sunburns and maladies resulting from a summer weekend at the beach were mixed in between.

Now the clinic was empty and I welcomed the serenity to catch up on the stack of charts that had accumulated.

The buildup in aviator training had necessitated that some flying periods began before the clinic was open in the morning. This meant that at the end of the first period more patients would need to be seen. The clinic personnel hoped there would be only a few because the July Alabama heat and Monday morning blahs had teamed up to create a generalized malaise among all of us. The next patient was accompanied by his instructor, which was highly unusual. My stimulated interest broke the lethargy.

The instructor, not the patient, recited the history.

"After the classroom briefing we had preflight maintenance problems with our aircraft," began the instructor. "By the time the necessary repairs were made, the rest of the flight had departed. It was getting quite warm and we had spent over an hour in and out of the aircraft. Because it was an instrument ride and bad weather had set the previous week's schedule back, we were under pressure to use every flying hour possible," continued the instructor.

All this time not a word had been uttered by the very tired looking student.

"We finally got off the ground and arrived at our assigned area. Captain Smith here is my best student, but after about 20 minutes under the hood he had not performed any maneuvers correctly . . . and that is unusual for him. I took the controls and told him to relax and rest for a while. *Relax* and *rest* he did. Not more than a minute or two after he took the hood off, he failed to respond when I asked him to call the tower. He was fast asleep, sitting up at that. And, doctor, that's why we're here. He was so unnerved by it that he couldn't fly the rest of the period."

All sorts of exotic diseases had come to mind as I listened, trying to get a head start on a direction for questioning. Epilepsy, hypoglycemia and a host of others passed in review. I noted that the student acted like his mouth was very dry. There was a hint of a stuffy

Aeromedic

The colds and other respiratory infections you catch from your nonrated friends may respond to the same off-the-shelf remedies that they use, but they also may have adverse effects during your flying

. S. Army Flight Surgeons

nose. So, playing a long shot I questioned, "How long have you had this cold? How many and what kind of cold remedies have you been taking over the weekend?"

The hunch was a lucky one. It seems that he had had a variety of cold symptoms that he feared would set him back, or possibly even "ground" him, if he had seen the flight surgeon. So, living off post he sought an off-the-shelf cold remedy from a drugstore. To make sure he made the best choice of available cold tablets, he queried the druggist and received a box of bright capsules with the label:

"Long acting—time release
Contains: drying agent,
decongestant, antihistamine
and analgesics . . ."

The pressure to fly, the heat, the delay and instruments were fatiguing in themselves. The medication did the rest. The capsule he had taken less than 1 hour prior to the flight was supposed to be a guarantee against an ear block. Instead, he got an unsatisfactory side effect.

The instructor felt that his student's judgment and decisions were so slow and inaccurate that had he been solo in marginal weather . . . the consequences could have been fatal.

* * *

To the flight surgeon: The drowsiness of antihistamines and the potentiation of this side effect by the other ingredients of combination cold capsules is well known. They are available in every drugstore, grocery store and many PXs. Few of us have the opportunity to see these side effects in the actual flying population. Most aviators realize the dangers of these drugs and self-medication of any type. Yet under pressure even some experienced aviators will resort to self-treatment to avoid "grounding" or missing a flight.

Education of both air crewmen and nonaviation medicine oriented medical personnel on the dangers of certain so-called simple drugs in the flying environment is becoming increasingly necessary.

Rarely does a simple cold result in the grounding of an aviator. The use of most cold tablets will, however. Air crewmen need to be aware that the flight surgeon has many medicines at his disposal that will give temporary relief, prevent an ear block and allow the safe execution of the mission when necessary.

Prevention is too late when an aviator shows up in the office . . . or morgue.

A Great Step Forward IN STANDARDIZATION

A new organization, the Standards Division, is being formed to provide an Army-wide flight standardization program. Herein lies the background and the various missions to be performed

Major Robert S. Fairweather Jr.

STANDARDIZATION is as vital to Army aviation as food is to animals. The growing complexity of Army aerial systems and missions increases the requirement for safe and operationally efficient crews. Every crew member must make maximum effective use of the equipment entrusted to him and minimize the opportunity for damage, injury or loss of life. Few (if any) Army aviators and other crew members would disagree with the need for standardization.

But how do we attain crew standardization? Who should be responsible for it? And what is wrong with the current system for standardization? These and many other questions have been explored by personnel at the U. S. Army Aviation School (USAAVNS), Ft. Rucker, Ala., during the past year. This article shares some of the more important thoughts, concepts and developments that have resulted from this extensive USAAVNS study of flight standardization.

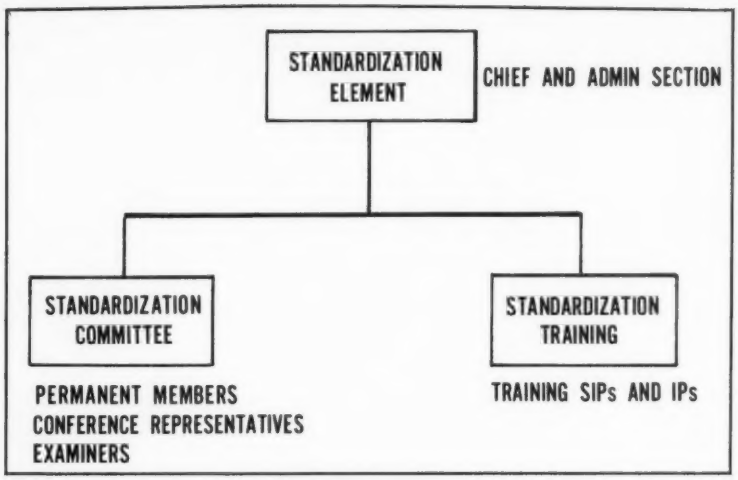
The original study began in July 1969 with the purpose of determining what changes needed to be made to the Army aviation instrument program. Trips were made to the U. S. Naval Air Station, Pensacola, Fla., and Craig Air Force Base, Selma, Ala., to collect information on the Navy and Air Force instrument programs. Additional data was collected from Federal Aviation Administration sources concerning its doctrine. At about the same time drafts of a U. S. Continental Army Command aviation safety study and the Department of the Army flight and ground standardization (FLAGSTAND) study were made available for examination.

When all of the information was assembled, a simple fact emerged: although the Army instrument program compares favorably with the other services, there is a great disparity in other areas of standardization. The Army has no service-wide system of standardization similar to the Naval Air Training and Operating Procedure Standardization or Air Force Standardization/Evaluation programs. However, many of the ingredients for a standardization program do exist and just need to be drawn together as mutually supporting parts of a system.

It was determined that the objective, or purpose, of an Army-wide standardization system should be as follows: To provide the Department of the Army and commanders at all levels with a system that will improve flight safety, enhance crew performance, ensure compliance with aviation training and flight directives and establish effective quality control over flight operations. Please note that the system would serve as a command tool. Standardization is a function of aviation command. It is so closely tied to the other responsibilities of the commander that it cannot, and should not, be separated from command channels. To be successful any proposed Army-wide program must be activated at all levels of the chain of command directly or indirectly concerned with Army aviation.

The USAAVNS recommendations for establishment of a specific Army-wide standardization program are still in the coordination/staffing stage. But some of the major concepts can be described in general terms. First, it was felt that implementation of a standardization program would be best accomplished by establishing the program in an Army regulation. AR 95-63 was used as a vehicle for the study recommendations since it already covered instrument standardization—a part of overall flight standardization. An alternative would have been to initiate a new regulation specifically for standardization.

Next, it was determined that the standardization organization most responsive to Army needs would



consist of an interlocking series of sections, with each section reporting directly to a commander. These sections called "standardization elements" would be formed at the major command level and at all subordinate levels, down to unit or detachment level, directly involved with aviation operations and training. To provide central direction an Army aviation standardization element would be established at Department of the Army level. The chief of each standardization element would be responsible to the commander at his level and be designated by him. The elements would be tailored to fit the special requirements at their levels but would be generally broken down into two functional areas as shown in figure 1.

The standardization committee would be similar to a standardization board in some respects but would accomplish more and would avoid the "club" stereotype. Permanent full-time members would be assigned in specialty areas coinciding with the type aircraft and flying peculiar to that command. These members would be the focal point for all standardization matters concerning their areas of specialty, conducting formal and informal evaluation and/or assistance visits to subordinate commands, supervising the dissemination of standardization information and developing recommendations concerning standardization for the commander. Conference representatives who would attend regularly scheduled conferences include the next subordinate level standardization element chiefs, subordinate aviation commanders and other desired personnel. All examiners within the command would receive staff supervision from the appropriate permanent members when acting in their examiner capacities. The standardization committee permanent members would be directly responsible to the element chief and would *not* have the authority to make policy. This authority would remain with the commander who would be responsible for ensuring that standardization policies within his command complied with standardization directives from higher headquarters.

The functional area of standardization training would encompass the establishment, supervision and conduct of contact and instrument proficiency, transition and refresher flight training programs at that command level. It would also include staff supervision of subordinate flight training programs. The work would be carried out by standardization pilots, instrument examiners and instrument checkpilots assigned to the element. Guidance as to standardization training required and how it would be accomplished would be generally outlined in the Army regulation and amplified in command originated local standardization policy.

To support the standardization effort, aircraft publications (aircraft operator's manuals, check lists, etc.) would become the only authorized references for crew procedures and would be improved as necessary on the basis of input received from standardization personnel. Other standardization assistance would be provided by Army standardization assistance teams which would travel to aviation commands throughout the Army. These teams could be provided by USAAVNS or some other Army agency closely associated with flight standardization. The school could also conceivably furnish standardization packets containing maneuver guides, instructor guides, training syllabi and other useful publications to unit standardization elements on request.

It must be stressed that what has just been discussed is concept only and still requires further staff/command action. But on the basis of these developed concepts, the U. S. Army Aviation School already has taken a very significant step toward transforming ideas into reality. A new organization called the Standards Division is being formed under the Office, Director of Instruction to accomplish the following missions:

- To provide an element to ensure standardization of USAAVNS and USAAVNS Element flight instructors.
- To provide a nucleus for the development of an Army-wide

flight standardization program.

• To develop a Department of the Army standardization instructor pilot training course.

The Standards Division is to be functionally organized as shown in figure 2.

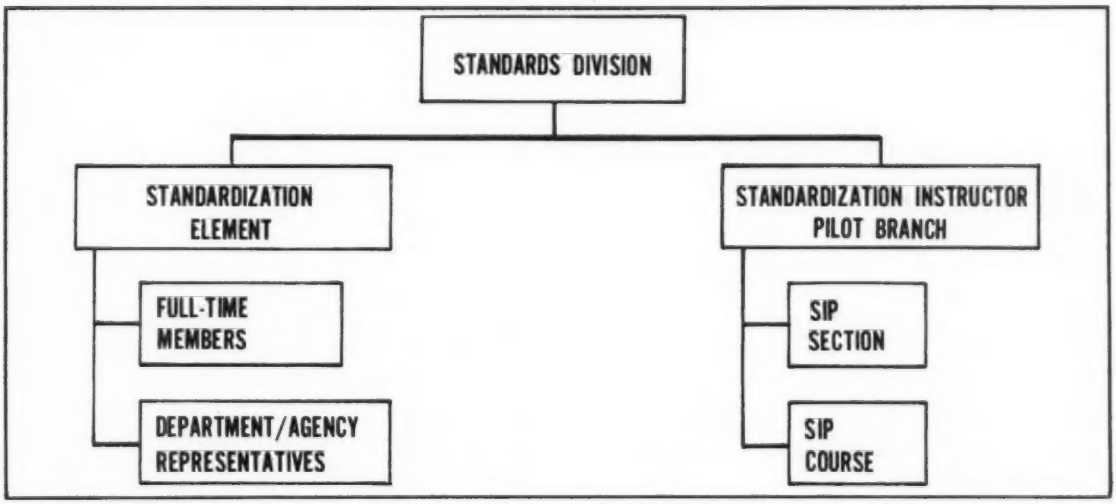
The standardization element, under command direction, will develop and establish standardization policies for the Army Aviation School. It will prepare, coordinate and staff standardization publications for flight training and supervise the flow of standardization publications to standardization instructor pilots (SIPs) and instrument examiners. Additionally, through preparation of input to publications and development of recommendations, it will continually take steps to enhance Army-wide flight standardization procedures. The full-time members will be commissioned and warrant officer aviators with extensive aviation training and standardization backgrounds—they will be selected for all-around ability. These aviators will be the "cream of the crop" and their responsibilities will be awesome because they will be the authorities in their areas of special interest.

The SIP Branch will administer final checkrides to aviators completing flight instructor methods of instruction (MOI); administer a specified number of instructor pilot (IP) and SIP annual standardization rides; and assist the standardization element in evaluating and improving school flight standardization. Also, the branch will establish and conduct formal SIP training. This training will have the purpose of teaching already qualified instructor pilots how to establish and supervise effective unit standardization programs. Very little time will be spent at the controls of an aircraft and most of the training will be presented academically. Another innovation is the establishment of a flight crew standardization NCO position. This NCO will be concerned with crew chief and door gunner standardization. Again, only the best qualified personnel will be selected for this branch.

Initially, the Standards Division will be formed as a branch under an existing division within the Office, Director of Instruction. The Standardization Element will be fully implemented but it will take some time to build the SIP Branch into a functional organization. However, when the SIP Branch is fully developed it is expected that this branch and the element will be expanded into the planned division. The differences between the proposed Army-wide standardization elements and the USAAVNS Standards Division are superficial and exist only because the entire school is geared toward flight training, whereas most aviation units have a tactical or support mission.

What will be gained from this increased emphasis on standardization? First, it should bring a great bonus in terms of reduced accident rates since standardization is a key part of accident prevention. Second, it should increase the efficiency and effectiveness of flight crews in the performance of missions. And third, it should improve the quality of flight training. A fallout advantage is that a formal Army-wide aviation standardization program will provide an aviation career field for the development of commissioned and warrant officers.

The U. S. Army Aviation School has taken a bold new step forward. The next step will probably come in the near future. It may or may not include all of the concepts discussed in this article, but it will surely be a decisive and far-reaching step. The time is now ripe for you, as a member of Army aviation, to join in cadence.



DEAR READERS: In the June 1970 issue of the AVIATION DIGEST, I was asked a question about the fuel flow in a UH-1D at 9,000 pounds and 90 knots. I refrained from answering and promised information on performance data charts in the next issue. Well, I'm blushing with embarrassment. What I was going to tell you was that we had a completely new series of performance data charts for the UH-1D/H undergoing testing at the U. S. Army Aviation School, alas, the charts have not been finalized. I do promise that in the near future you will have a completely new set of charts that are simple to read and will give you the performance data you will need for performing your mission.—Danny

Lately, there have been very few letters coming into our mailbox. Have we finally removed all the "bugs" from the manuals? Surely there must be something you pilots and crew chiefs want to say about the manuals. Let's hear from you.

Dear Danny: In the February issue of the AVIATION DIGEST you spoke of the go no-go procedure for the UH-1H. Can I use the go no-go procedure as outlined in the AH-1G dash 10 for my UH-1H since they both have the same type engine?

CPT V. E. C.

Danny's answer: It is strongly recommended you NOT use this procedure. The AH-1G dash 10 has a warning note: "DO NOT EXCEED 50 psi torque." You can easily exceed your torque pressure prior to reaching your authorized N_1 percentage since this go no-go procedure is not valid under ALL conditions. Steps are being taken to remove this procedure from the AH-1G dash 10. It has been removed from the TM 55-1520-210-10 manual.

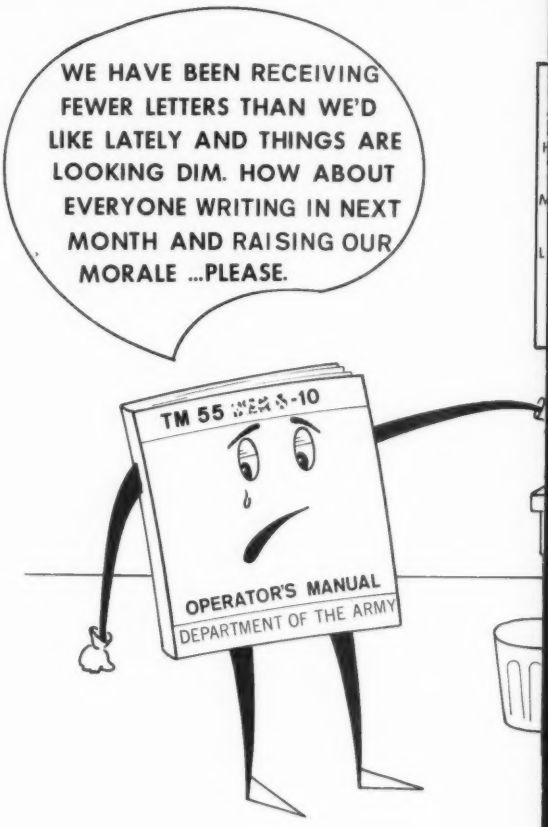
★ ★ ★

Dear Danny: Paragraph 2-160 of TM 55-1510-204-10/4 states: "The master caution light will glow simultaneouly with the landing gear caution light." I do not agree.

Mr. J. M. C.

Danny's answer: I do not agree either. The only items that will trigger the MASTER CAUTION light are items that are contained in the CAUTION ANNUNCIATOR panel or the MASTER CAUTION test switch. Change 1 removed that sentence from paragraph 2-160 but, unfortunately, the last sentence in paragraph 2-162 which is also incorrect was overlooked. It will be corrected when Change 2 is published.

Charlie and Danny's


WE HAVE BEEN RECEIVING FEWER LETTERS THAN WE'D LIKE LATELY AND THINGS ARE LOOKING DIM. HOW ABOUT EVERYONE WRITING IN NEXT MONTH AND RAISING OUR MORALE ...PLEASE.
OPERATOR'S MANUAL
DEPARTMENT OF THE ARMY

Dear Charlie: In the October issue of "Charlie and Danny's Write-In," you stated that a shortfield takeoff chart would soon be added to the U-8D operator's manual and pilot's checklist. Has the chart been produced and is it available?

LTC J. H. A.

Charlie's answer: A request for a minimum run takeoff chart using the takoff procedures and configuration given in the U-8 operator's manual was submitted to the U. S. Army Aviation Systems Command. We have been advised that data is not available to prepare the charts since it was not developed at time of flight test during original procurement. Due to austere funds at this time, it is doubtful that the data can be obtained in the near future. Meanwhile, we suggest that you U-8 drivers having to make "shortfield takeoffs" allow yourselves plenty of margin.

Write-In

Dear Charlie: The T-41B checklist requires that the flaps be lowered on the preflight "Before Exterior" check and not raised again until the "Before Taxiing" check. Besides the flaps being in the way during preflight, it would appear that the aircraft is more susceptible to wind gusts and that their operation is a drain on the battery. How about making a flap check after the engine is running?

MAJ R. S. F.

Charlie's answer: The flaps on the T-41 are lowered during the "Before Exterior" check so that the pilot may get a closer look at the flap bracket and hinge during the "Exterior" check. The T-41 flap has only two hinges and experience indicates that this is a weak area. During the "Exterior" check you should look carefully for bending or cracks. The flaps are not raised until the engine is operating to conserve power for starting.

Dear Danny: While studying my Mohawk dash 10 I ran into an item that's got me confused. It concerns dropping empty resupply containers. On page 6-24 of TM 55-1510-204-10/4 there is a warning that reads: "Do not release empty resupply containers (with or without fins). They are aerodynamically unstable when empty and may damage the aircraft or foul the parachute after release." Then on page 7-19 there is a note stating, "Empty resupply containers may be released at speeds up to 240 knots IAS." Which statement is correct?

CPT M. C. S.

Danny's answer: I don't know of any place where resupply containers are being used by Mohawks, but if you ever use them don't drop them when they're empty. They are aerodynamically unstable and may damage the aircraft or foul the parachute after release. The note on page 7-19 is wrong and will be corrected in Change 2 to the operator's manual.

★ ★ ★

Dear Danny: I am a CH-47 crew chief here in RVN. I very strongly feel that the dash 10 and checklist should include flight engineer/crew chief flight duties and procedures. Are you doing anything along that line?

SP5 C. G. S.

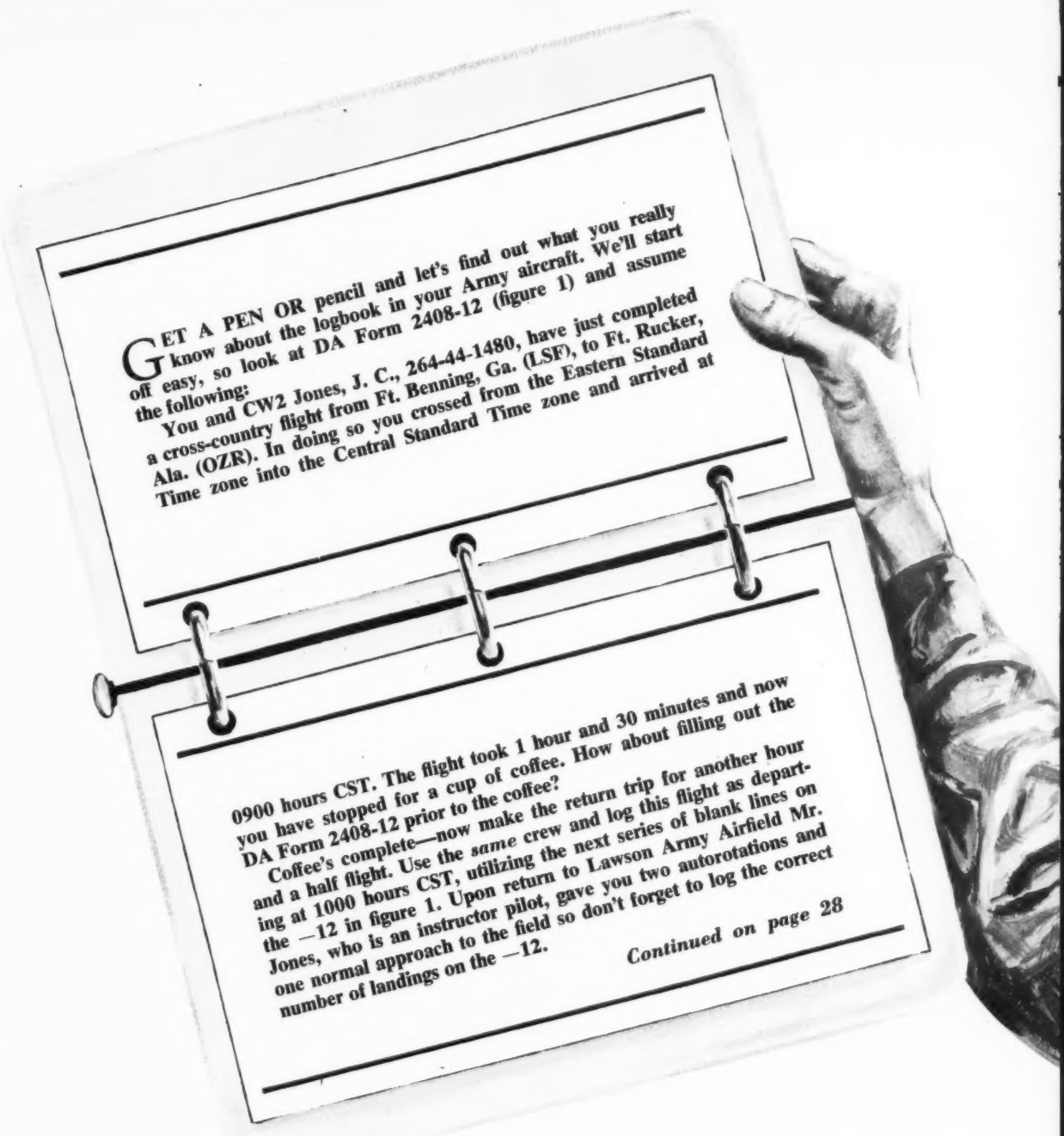
Danny's answer: In short, the answer to your question is yes. We are attempting to gain Army-wide acceptance of the fact that multi-crew aircraft operator's publications should delineate crew duties and should expand on the information of concern to flight engineers and crew chiefs. We sure could use some ideas from you fellows on what flight engineer/crew chief information should be included.

★ ★ ★

Dear Danny: I am a unit standardization instructor pilot and have a slight problem. None of the aviators recently out of flight school to whom I give standardization rides seem to know the proper procedures for hydraulic failure in the UH-1D/H aircraft. I am wondering if I am in error.

CW3 E. L. G.

Danny's answer. The procedures for hydraulic failure in the UH-1D/H aircraft are in the dash 10 and checklist and also the standardization guides used at the Aviation School. I guarantee the aviators have been taught the correct procedures during their training.



GET A PEN OR pencil and let's find out what you really know about the logbook in your Army aircraft. We'll start off easy, so look at DA Form 2408-12 (figure 1) and assume the following:

You and CW2 Jones, J. C., 264-44-1480, have just completed a cross-country flight from Ft. Benning, Ga. (LSF), to Ft. Rucker, Ala. (OZR). In doing so you crossed from the Eastern Standard Time zone into the Central Standard Time zone and arrived at 0900 hours CST. The flight took 1 hour and 30 minutes and now you have stopped for a cup of coffee. How about filling out the DA Form 2408-12 prior to the coffee?

Coffee's complete—now make the return trip for another hour and a half flight. Use the *same* crew and log this flight as departing at 1000 hours CST, utilizing the next series of blank lines on the —12 in figure 1. Upon return to Lawson Army Airfield Mr. Jones, who is an instructor pilot, gave you two autorotations and one normal approach to the field so don't forget to log the correct number of landings on the —12.

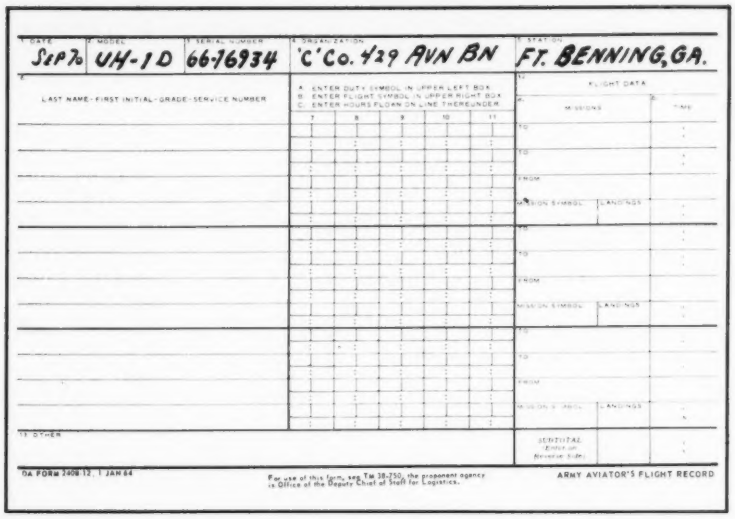
Continued on page 28

what do you know about

Aircraft Logbooks?

Major Richard C. Hodgkins

Knowing your aircraft logbook can not only save you a great deal of unnecessary trouble but also may someday save your life


1. DATE
2. MODEL
3. SERIAL NUMBER
4. ORGANIZATION
5. STATION
Sep 70
UH-1D
66-16934
'C' Co. 429 AVN BN
FT. BENNING, GA.
6. LAST NAME - FIRST INITIAL - GRADE - SERVICE NUMBER
A. ENTER DUTY SYMBOL IN UPPER LEFT BOX
B. ENTER FLIGHT SYMBOL IN UPPER RIGHT BOX
C. ENTER HOURS FLOWN ON LINE THEREUNDER
7 8 9 10 11
12. FLIGHT DATA
a. MISSIONS
b. TIME
TO
FROM
MISSION SYMBOL
LANDINGS
13. REMARKS
SUBTOTAL
DA FORM 2408-12, 1 JAN 64
For use of this form, see TM 38-750, the proponent agency is Office of the Deputy Chief of Staff for Logistics.
ARMY AVIATOR'S FLIGHT RECORD

Continued from page 26

Figure 1

The —12 is complete now. Let's see how much you know. You may have noticed that the month and year were entered in block 1 of the form in figure 1. Did you put in the day of the month? Believe it or not, this is the aviator's responsibility. The crew chief is responsible for completing the heading of the —12 with the exception of the day—that's up to you.

Take a look at column 12b "Time." You crossed a time zone in these two flights. Are your takeoff and landing times correct? Here's how it works. When aircraft fly between different time zones, the "To" and "From" entries will be recorded in terms of the time zone at point of takeoff. Therefore, your first flight should read "From" 0630 "To" 0800 and the second "From" 1000 "To" 1130. If that's still confusing to you take a look at paragraph 4-11c(2)(e) in TM 38-750. That's right by the book.

Check your return trip now and see how you logged the crew members' names. Naturally I was trying a trick question and used the term *same*. However, this is not the correct entry on the —12, nor is it correct to say *same as above*. When a series of consecutive flights are made by the same crew the names of crew members need not be repeated. If a crew member changes then the whole works has to be entered on everyone in the succeeding flights.

Now here's another easy one. How did you log the landings in column 12a on your return flight? If you put 3 in there you're wrong. Here's why: For helicopters, a distinction between normal landings and autorotative landings will be accomplished by citing the number of normal landings, then the number of autorotative landings followed by the letter "A." The correct entry in this case should have been 1-2A. (Now whoever heard of that?)

I did say that the —12 was the easy one, didn't I? If I didn't manage to catch you short on any items so far maybe I can on the one coming up. There are many things that aviators must know—and do know—about the 2408-13. But there is more that they should know to be really professional. Let's see how you stand.

Look at the —13 (figure 2) and assume this is the way you found it in the logbook prior to your flight this morning. So that you don't make the same mistake twice it is again the aviator's responsibility to fill in the day of the month and this is to be done prior to takeoff. Now look the form over very carefully. There are a couple of obvious mistakes on the form. Can you spot them?

First, in block 6a the crew chief did not enter the total number of pages of —13s that currently are being used on this aircraft. I'll admit that I'm nit-picking in this instance because it's rather obvious that there is only one due to the number of write-ups on the form. However, it is the crew chief's job to fill in this block every time he makes out a new form. This becomes very important when you find an aircraft with all of the lines in block 17 filled out. Without this entry the aviator does not know if there has been a continuation, or page 2, unless he checks with the crew chief. And check you should. As additional —13s are initiated as continuations this entry will be changed.

The next obvious error is found in block 7 "Status Today." Item 2 shows a red X and there is no red X shown down in item 16. Somebody goofed somewhere and you must get it corrected before your flight. After your crew chief has assured you that the error is purely administative, that there is no red X condition on the aircraft, how do you correct the entry in block 7? That's easy. Take your eraser and erase the X and change it to a diagonal. Right? Of course that's wrong. Nothing is that easy to correct on something as important to you as the status of the aircraft you are about to fly. A status symbol once entered in the "Status Today" box will not be initialed over, erased, changed or duplicated even if entered in error. Status changes during the day will be recorded in the next open box. Any erroneous entries in the

16	17	18	19
	Incorrect status in block 7, item 2	Entered correct status in block 7, item 3	*John Doe*

"Status Today" block will be appropriately explained in block 17. Action taken will be explained in block 18 and verified by signature in block 19. The correct entry is shown in the block above.

Breeze on over to block 9 and take a look at the block entitled "Other." Most units that operate aircraft with turbine engines use this block to indicate when the next hot end inspection is due on the engine. (Some units, however, utilize the space under item 10c entitled "Other." Either one is correct and it depends on your local directives.)

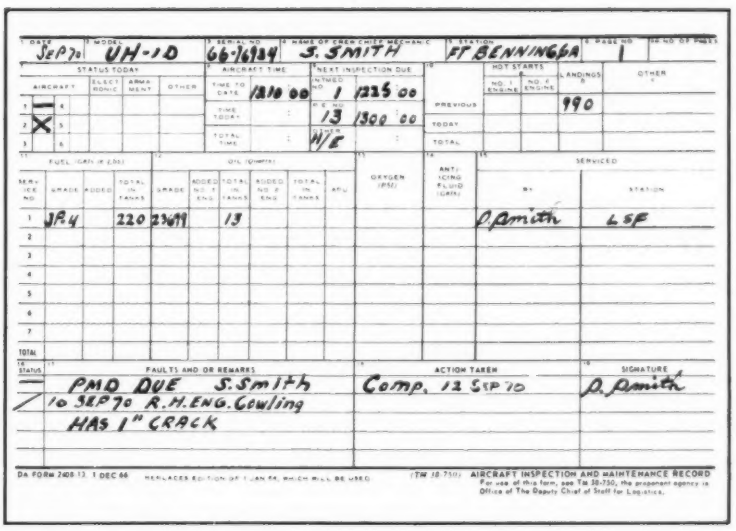
Incidentally, while you're in the area check block 10. Notice the 990 landings entered in block 10b? That number of landings is obviously wrong—990 landings in 11 days is not reasonable (landings in block 10b are kept on a calendar month). Note also the glaring blanks under "Hot Starts" in block 10a. A cumulative total of hot starts must be kept on an engine as long as it is installed in a particular aircraft.

In this instance the point I'm trying to make is that your crew chief has neglected to include the time that the inspection is due. So how can you be sure that the aircraft is not due an engine hot end inspection without taking that long walk back to the maintenance office to check the historical records? (Don't say you'll send the crew chief because that's not the right answer.) I know I won't catch any old maintenance types on this one but I wonder how many of you recall that there is such a thing as a 2408-18 in the aircraft logbook? Properly entitled "Equipment Inspection List," the 2408-18 usually is the last page in the logbook and, consequently, the least looked at by pilots and crew chiefs alike. (Believe me, most command maintenance management inspectors don't miss it though.)

As you can see in the example shown in figure 3 there is a world of information that you should be aware of prior to your takeoff, and it's all right there in the logbook. Now if your crew chief is on the ball you should find when the next hot end is due on the aircraft. Too often though you also will find that crew chiefs who omit times from the —13s have probably not kept their —18s current either—and you'll be making that long walk to maintenance anyway. The important thing to remember is that the —18 is located with the aircraft and it is your responsibility to inspect it when you preflight the aircraft.

I'm a little off the present subject, so let's get back to the —13. Notice down in column 11 we have our fuel servicing data and our aircraft has the following under service number 1: JP-4 grade, blank added and 220 total in tanks. Did you ever wonder whether that 220 was gallons or pounds? Even though TM 38-750 does not require that this be specified it is a good local SOP to have crew chiefs or other servicing personnel line through either the gallons or the pounds, whichever is not applicable, in block 11 of the —13. This leaves no doubt in your mind as to which of the two measures you are using. This could get extremely tricky if personnel started mixing gallons and pounds in the "Total in Tanks" column (block 11) of the form—especially for the poor guy who has to total them at the end of the day.

Figure 2



1. NOMENCLATURE	2. MODEL	3. SERIAL NUMBER	4. PAGE NO. 1 NO. OF PAGES 2
HELICOPTER UTILITY	UH-1D	66-16934	

5. ITEM TO BE INSPECTED	6. REFERENCE	7. FREQUENCY	8. NEXT DUE
WEIGHT AND BALANCE	AR95-16	12 MONTHS	
FIRST AID KITS	TB 55-1500-308-25	12 MONTHS	
INVENTORY OF INSTALLED EQUIPMENT	TM 55-1520-210-20	12 MONTHS	
STANDBY COMPASS SWING	TM 55-405-3	12 MONTHS	
GYRO MAGNETIC COMPASS SWING	TM 55-405-3	12 MONTHS	
ALTIMETER STATIC LEAK CHECK AND CALIBRATION	TM 55-1520-210-20	12 MONTHS	
SAFETY LAP BELTS CREW/TROOP REPLACE (NYLON)	TM 55-405-3	60 MONTHS	
SHOULDER HARNESS REPLACE (PILOTS)	TM 55-405-3	60 MONTHS	
SHOULDER HARNESS REPLACE (CO-PILOTS)	TM 55-405-3	60 MONTHS	
INTERNAL INSPECTION OF ENGINE T53 L-9/9a/11/11b	TB 55-2800-200-30/4	400 HOURS	
INTERNAL INSPECTION OF ENGINE T53 L-11/c/d	TB 55-2800-200-30/1	600 HOURS	
FIRE EXTINGUISHER WEIGHT CHECK	TB 55-1520-210-20	6 MONTHS	
T/R HUB ZYGLO INSPECTION	TB 55-1500-206-30/1	100 HOURS	
ENGINE OIL SAMPLE	TWX MSG AMSAV EGE-3-1335	12½ HOURS	
XMSN OIL SAMPLE	TB 55-6650-300-15	25 HOURS	
42 DEGREES G/B OIL SAMPLE	TB 55-6650-300-15	25 HOURS	
90 DEGREES G/B OIL SAMPLE	TB 55-6650-300-15	25 HOURS	

DA FORM 2408-18, 1 JAN 64 — EQUIPMENT INSPECTION LIST (TM 38-750)

Figure 3

You may also have noticed that in block 15 the crew chief has filled in the "Serviced By" and "Station" blocks even though he did not add anything to the fuel or oil tanks. Did he do right? For once he's correct. Normally prior to the first flight of the day the first line will have "Added" spaces blank. Entries of "Grade" and "Total in Tanks" and signature in block 15 will indicate by whom the "In Tanks" check was performed. This means the crew chief has physically checked the tanks and has certified that the tanks now hold the amounts indicated on the form. The fact that he checked the tanks indicates a service in this case. It also is important to ensure that the "Station" column is always correctly entered. If you're flying around the countryside and experience an engine failure due to contaminated fuel, it is important to know to which service station to return the parts of your aircraft (and see if they fit down the POL officer's throat).

I also would like to point out another well known fact that is frequently disregarded by servicing personnel. Anytime fuel or oil is drained or otherwise removed from the tanks an entry is made in the servicing columns of the —13. This is accomplished by placing a minus (—) sign in front of the quantity removed under the "Added" columns and adjusting the totals appropriately.

Look down to item 17 on your —13 and assume you've just completed flight number 1 and write up these faults: *FM inoperable, RH cargo door sticks.* That's easy enough, I'll agree, but you'd be surprised at how many aviators will attempt to write two or more faults on one line of the —13. Conservation is a good idea, but not in this case. Only one fault will be entered on any one line, but as many lines as necessary may be used to adequately describe a fault. This requirement is obvious because each fault must have its own "Action Taken" line under item 18 and its own status symbol under block 16. It becomes very difficult for a mechanic to explain action taken on two faults on the same line. Don't forget that the aviator's signature will be entered after the last fault and/or remark.

While you're on the ground at Ft. Rucker you figure now is a pretty good time to get your FM radio repaired. Since you made this write-up on a single line in the "Faults" column, it is given a status symbol in block 16. Now what? Suppose we jump up to block 7 "Status Today" and place a diagonal in the "Electronic" block. Right? Of course not. A status symbol associated with a fault pertinent to "Communicate or Navigate" type of avionics equipment will be considered as an aircraft fault and entered (when applicable) in the "Aircraft" column in lieu of the "Electronic" column.

What purpose then do the "Electronic" and "Armament" status blocks serve? The status symbols entered in these blocks will indicate whether mission-essential equipment is operational. A red diagonal will indicate that the equipment is not fully operational. *A status symbol in these columns will not indicate aircraft status. Aircraft status will be reflected only in boxes 1 through 6 under "Aircraft."* A status symbol in the "Electronic" column will indicate the status of electronic equipment only such as side looking airborne radar, camera equipment or infrared equipment.

Now how about that sticking cargo door? Time to get that corrected before we make the return flight, so we ask the transient maintenance people if they can help us and they do. The transient mechanic graciously greases the door a little and it works fine now. So he enters the word *corrected* in block 18 of our —13 following the fault, signs his name in block 19 and initials over the status symbol in block 16. Right? Wrong! Here's why: When a fault listed is corrected the mechanic making the correction will enter a brief description of the corrective action taken in block 18. The words *replaced, repaired* or *adjusted,* as applicable, with additional brief pertinent information pertaining

thereto, will be considered as adequate description of action taken. The word *corrected* will not be used. So a good corrective action write-up would be *lubricated door.*

Now we're ready to go. Wrong again! Our transient mechanic has failed us again by forgetting a most important point which very often is overlooked. When corrective action is accomplished on an aircraft away from its home station, the name of the station at which the corrective action was taken also will be entered in block 18. The corrective action should have been *lubricated door at Ft. Rucker, Ala.* If your door fell off on the trip home you sure do want to be able to find the guy who's going to buy you a new one.

Now that you've mastered some of the lesser known facts about the —13 let's go back and examine (for general information) the purpose and use of the —13. This will help to understand why some of these seemingly unimportant entries we've been making are required. The stated purpose of the —13 is to provide a record for maintenance and service performed on any Army aircraft. The form is used to:

- Record detected faults and the action taken to correct them.
- Maintain a continuing record of aircraft flying hours.
- Record maintenance and servicing performed.
- Indicate when scheduled maintenance inspections become due.
- Indicate status of the aircraft and of the installed mission-essential equipment.

Let's consider the 2408-14. I did not include an illustration of it because, unlike the —18, most of you do know that it is in the logbook. If not you're in trouble. The —14 is entitled the "Uncorrected Fault Record" and this is exactly right. It is used to record uncorrected faults, to include overdue replacement of components and the reason therefor. It is most essential that this form be checked prior to your flight along with the —12 and —13.

There are a couple of lesser known facts about the —14 that we should discuss. Most maintenance types know them but many aviators may not. First, faults bearing the status symbol of a red X or a circled red X will not be entered on this form. The only place they can be entered is on the —13 where they remain until corrected. Second, red dash (—) status symbols may be entered on the —14 when component overdue replacement items are involved or when it is necessary to defer a normal modification work order past its normal expiration date. However, to do this (and this is the part that is usually forgotten) a red (—) status symbol will be placed in blocks 7 and 16 of the —13, and the —13 will carry the following reference in block 17: *component(s) overdue replacement or overdue MWO.* This is necessary for the "Status Today" block of the —13 to always reflect the correct and current status of the aircraft.

Now that we've passed through some specific, but not too well known, items of the aircraft logbook, let me question you on some other not too well known items that pertain to all of the forms. For instance, take another look at the —13. Notice that on most UH-1Ds we do not utilize oxygen or anti-icing fluid. Therefore, there are no entries made in blocks 13 or 14 of our form when we service the aircraft. Is this correct or should we put in zeros? Leaving them blank is correct this time.

How about other blank spaces on other forms? Here's the criteria according to TM 38-750: Spaces not requiring entries due to the configuration or type of the equipment will be left blank unless otherwise indicated. So zeros are not used unless specifically indicated.

Have any of you pilot types ever wondered if you could fill out a —12 and —13 with anything other than a pencil? Well can you? Our book tells us that we can use a ball point pen, pencil or, if you happen to be carrying one around, a typewriter. However, it usually is not desirable to use a pen on the —12 and —13 even though it is permissible as they sometimes get messy and unreadable.

You may notice that often abbreviations are used on various forms in the logbook, especially on the —13 under "Faults and/or Remarks." This is permissible and actually TM 38-750 tells us that the use of authorized abbreviations is encouraged. The key here, however, is the word *authorized.* If you or your crew chief start making up your own, anyone else that happens to have occasion to read your logbook may have trouble interpreting it. So if you do abbreviate make sure abbreviations are *authorized.*

The last form that I'll discuss is the first one in the logbook. And since it is the first you may never have even noticed it. The DA Form 2408 entitled "Equipment Log Assembly" is nothing but the cover sheet for all of the records found aboard the aircraft. It actually has little value to the aviator except that the backside of the form explains some of the symbols that are used on the —12. It also gives a very good explanation of the status symbols used and, therefore, will be worth your while to take a look at the next time you're out at an aircraft. The frontside of the form contains four sentences that tells what the logbook is all about. In case you have never taken the time to read it, it would be to your benefit to look at it the next chance you get. You might be surprised at how little you really know about your aircraft logbook.

OVERLOOKING THE OBVIOUS

–AND THE NOT SO OBVIOUS

I personally preflighted one of my unit's O-1s immediately after it had been refueled. While checking the right side of the engine, I found four top spark plug connections so loose they could be manually tightened

Captain F. Lloyd White

O-1 BIRD DOG accidents in the Republic of Vietnam can be caused by weather, enemy ground fire, materiel failure, pilot error and negligence—intentional or inadvertent.

Inadvertent negligence is a broad category. From personal experience here are several incidents that appeared frequently enough to merit comment. Hopefully, recalling these incidents may help prevent similar accidents or near-accidents for others, particularly on the part of recent aviation school graduates assigned to Vietnam for their first tour of flight duty.

The preflight of an O-1 is a rather simple uncomplicated inspection. After several months this procedure becomes briefer as the pilot becomes more experienced and familiar with the aircraft. Soon a modified preflight inspection or no preflight inspection except a quick look at the gas and oil becomes a matter of routine.

I personally preflighted an O-1 immediately after it had been refueled following a 2-hour flight. While checking the right side of the engine I found four top spark plug connections so loose they could be manually tightened.

Inspection of the logbook revealed that the previous pilot had experienced excessive rpm decrease during the runup magneto check. The crew chief had replaced four top plugs and evidently failed to tighten the plug connections with a wrench. The pilot in his preflight had failed to recheck the crew chief's repair job, hence an incomplete preflight. If all four connections had worked completely loose in flight due to normal vibration it is questionable whether the aircraft would have maintained flight. An unnecessary forced landing, or possibly an accident, could easily have resulted causing serious injury or death. If such an obvious maintenance error can be overlooked, how much easier it is to overlook something less obvious.

Something much less obvious but equally important is the rudder pedal control cable assembly unit where it connects to the tail wheel. The bell crank to which the cables attach is manufactured in such a manner that when either rudder pedal is depressed the cable pulls the bell crank forward, and due to a locking indent it also turns the tail wheel in the direction needed to produce the desired turn. This tail wheel control is most important on takeoff and landing rolls when directional control is crucial. If the indent becomes worn a depressed rudder pedal turns the bell crank but not the tail wheel. With insufficient air speed to make rudder control effective and when braking action from the two main wheels is not feasible, a pilot finds himself unnecessarily in trouble.

Another personal experience recalls an actual forced landing in Vietnam due to a gradual but steady decrease in rpm. All emergency procedures failed to remedy the problem and a forced landing was accomplished without injury to the crew or damage to the aircraft. A postflight inspection performed several hours later, with a squad of troops providing security, showed that the throttle linkage

The accident at left resulted from failure to pre-oil. This caused engine failure at night and the CH-34 crashed and burned

between the throttle and the carburetor had become loose. While it performed correctly during ground operations and runup procedures, only 15 minutes of flight time was necessary to work the linkage loose enough to make the throttle ineffective. This caused the forced landing which fortunately did not have serious consequences.

I also have known several pilots who have been so familiar with the O-1 that no light was needed to double-check when switching fuel tanks on night flights. This bit of overconfidence by these "old pros" caused the engine to cough and die.

In other instances I have seen competent but anxious pilots become overconfident and take off with weak brakes. They obviously felt they could handle the aircraft under any condition, but ground looped the aircraft on landing because of brake failure.

Lastly, I have known combat experienced pilots to run fuel tanks dry. One I remember most vividly had the engine die completely while taxiing off the active after landing. Five minutes before he had been contouring down a river.

The point is, a little extra effort, the expenditure of a little more time, closer attention to detail and the ability to discipline oneself to a very thorough and conscientious preflight is vital. Experience should produce the ability to detect the "not-so-obvious" problem areas. Familiarity should produce additions, not deletions, to published preflight checklists. A thorough preflight characterizes the professional and often can mean the difference between the living and the dead.

A good preflight is one of the best ways to avert embarrassing situations such as the O-1 pilot encountered at the right

Photo by CW4 Bill C. Walton

This Year's Writ

Here are some interesting facts on the criteria used in compiling this year's writ. The final results of 500 exams provide revealing statistics

Major James G. Moreau

ONCE AGAIN statistics reveal that some aviators are taking the annual writ too lightly. This is true despite the fact that there have been many comments from commanders, examiners, standardization board members and aviators that the exam is too easy.

A few of the revealing statistics compiled from this year's writ results are as follows:

• 4.25 percent of all aviators failed the exam—approximately 850 aviators.

• 1 percent failed Version I (for fixed wing aviators or dual rated aviators without a rotary wing instrument ticket).

• 3 percent failed Version II (for fixed wing aviators or dual rated aviators without a rotary wing instrument ticket).

• 7 percent failed Version III (for rotary wing aviators who have a tactical instrument ticket or are rated for VFR only).

• 6 percent failed Version IV (for rotary wing aviators with standard instrument tickets).

• 26 percent of all aviators did not know the requirements for a position report in a nonradar environment.

• 29 percent of all aviators did not know the approach minima for an automatic direction finder (ADF) approach.

• 30 percent of all aviators could not determine the minimum obstacle clearance altitude (MOCA) along an airway.

The 1970 annual writ was based on command guidance which directed that the following criteria be adhered to in compiling the exam:

First, all questions had to be straightforward, i.e., the examinee should have no doubt about what the question asks.

Second, only questions were asked that the aviator normally deals with on an average IFR flight, whether he flies once a month or every day.

Third, questions that would not benefit the average pilot would not be used. Most of us don't need to know about jet airways, so why ask?

Fourth, questions that had a high failure rate from last year's exam would be reworded to find out if pilots still need help in those areas or if the questions were just badly written.

Fifth, questions which could not be answered by referring to the examinee's reference material were not used. If the answer is in a publication that the aviator doesn't have, how can he be expected to know it?

Ninety-eight percent of the questions on the writ could be answered by eliminating wrong answers. Most of the correct answers were verbatim from the regulation or publication from which they were taken in order to provide the aviator with a ready reference for future use. The main objective of the annual written examination was to update the aviator on regulations, procedures and general aviation knowledge. To do this, the above criteria as to format, questions and answers had to be followed.

It is also interesting to note that the pilots who knew how to check a VOR best were *tactical ticket holders*. This is strange since they have no requirement to be up-to-date in this area. At the same time, 20 percent of the fixed wing aviators missed this question on Version I and 13 percent on Version II. Six percent of the rotary wing pilots missed it on Version III and 16 percent on Version IV.

In position reporting, fixed wing did better than rotary wing aviators: 20 percent of the examinees missed this question in Version I; 21 percent, Version II; 32 percent, Version III; and 32 percent, Version IV.

On ADF approach questions, 23 percent missed on Version I; 35 percent on Version II; 30 percent on Version III; and 28 percent on Version IV.

Another question which caused some problems concerned the choice of altitude and airway in going from point A to point B. Simple? Well, a lot of us didn't think so. Eighteen percent of Version I examinees missed this question; 19 percent, Version II; 27 percent, Version III; and 19 percent, Version IV.

These are just a few of the high miss areas totaling 15 questions. The other 35 questions on the exam had a very small miss factor. The exam results point out the fact that we should pull out the books and do a little studying on basic knowledge. Look at the high miss area comparison chart and see just where you line up. The chart is for your information and is not meant to be a blow to your ego. The chart is based on a survey of 500 aviators taken world-wide. Each answer card used in the survey was handchecked. The average grade of the 500 aviators surveyed was 86 percent. This included maximum grades of 100 percent and failing grades of less than 80 percent. None of the answer cards used in the above survey were from the U. S. Army Aviation School or any of the USAAVNS elements. The school and elements were eliminated because their instructor pilot personnel would not offer a fair comparison with aviators outside the school environment.

Well, those are some of the facts and results of the 1970 writ. Each aviator will have to make up his own mind on how he stands and determine if he found the exam beneficial or not.

HIGH MISS AREA COMPARISON IN PERCENT

	Version I	Version II	Version III	Version IV	Average
VOT check	20	13	6	16	13.5
Position report (nonradar)	20	21	32	32	26.25
Position report (radar)	8	17	10	18	13.25
Approach light system	24	15	—	21	20
Approach minima	23 ADF	35 ADF	30 ADF	45 W/G/S 14 VOR 28 MSL	29
VFR distance determination	33	19	31	27	27.5
MOCA along airway	26	34	30	29	29.7
Minimum sector altitude	14	21	—	11	15.3
Runway length	17	23	—	24	21.3
Alternate airfield requirements	10	24	41	36	28
IFR fuel requirement	—	—	21	12	16.5
IFR altitude request	18	19	27	19	20.7
IFR weather	4	0	45	—	16.3
Sequence report	19	17	35	31	25.5

Aviation Management

ONE MOSS-GROWN and widely held belief in the world of sports is that a manager or coach is no better than his material. Anybody can look like a genius if he has a squad loaded with the likes of Joe Namath or Mickey Mantle.

Fiddle-faddle! And perhaps even Pish and Tush! This theory is about as valid as the one that tells us that babies are flown in by the stork or that if you go to bed early enough every night you'll wind up healthy as a bull, rich as Rockefeller and wise as King Solomon. Things ain't that easy.

The fact is that some managers and some coaches are better than others. Club owners know this. They don't like to part with their hard-earned cash any more than the rest of us, but they are willing to turn in their eye teeth to get the services of people like Vince Lombardi or Ted Williams, men who have mastered the not-so-simple arts of leadership and inspiration. Lombardi and Williams don't like to be associated with losers. The players who work for them quickly acquire the same idea if they really want a long and profitable career up there with the big boys.

Born geniuses? Not at all. Lombardi and Williams don't own a patent on sound managerial practices. Ask either of them what goes into successful coaching techniques and they will probably tell you that it is a smooth blend of planning, unrelenting hard work, applied psychology, discipline, sympathetic understanding of a man's problems and attention to detail. Maybe coaches don't end up with lumps and bruises and spike wounds after a game. That doesn't mean they don't work about twice as hard as anybody on the field, day in and day out.

The result of all this concentrated effort is a team —a highly coordinated and well-oiled piece of human machinery made up of two or three dozen highly skilled and often temperamental athletes. When it is working the way it is supposed to it is a joy to behold. The points go up on the scoreboard, the runs come across the plate. Everybody is happy except for the poor chaps on the other side who are taking the clobbering.

What has all this got to do with Army aviation?

Sense

Major Chester Goolrick

When it comes to accident prevention in Army aviation, management is nothing more than command emphasis on a constant and coordinated program . . .

Just about everything.

PROFESSIONALS, ALL

Football players and Army aviators all wear helmets and uniforms. The resemblance doesn't stop there, not by a long shot. To a man, the players and the flyers are professionals, operating in the rarified air of the big leagues where the pressures are tight and never relax. They are all key components of units in which there is no margin for error and no room for prima donna performers. In a topflight aviation unit, every man knows his role, is conscious of his responsibilities toward himself and the men around him, and never lets up. The points go up on the scoreboard, which is one way of saying that the accident rate goes down. In aviation terms it amounts to the same thing.

But it doesn't just happen, any more than a foot-

ball team makes it to the top because everybody on the squad carries rabbits' feet and was born under a lucky star. Somebody has to furnish the players with the drive, know-how and determination they need to become champions. Somebody has to weld them together into a *team* and pump them full of the pride they need to stay that way.

It starts at the top, as Lombardi and Williams and the men who hand them their fat paychecks all know. It's a ceaseless process, too. Maybe *you* think the football season comes to an end when the last fan files out of the Super Bowl stadium. For the coaches it is a seven-day-a-week, year-around job. If you don't believe it, ask their wives.

What's extra good about this kind of dedication is that it is as catching as the German measles. When the man at the top has a full appreciation of the problems and what's at stake and keeps on the ball on an around-the-clock full alert, it doesn't take long before everybody in the outfit including the bat-boy, the team mascot and the people selling the pop-corn get the same idea.

When that happens, you've got a team—a team which can make it to the top and stay there.

If this sounds like a lot of hard work, it is. In fact, it is even harder than it looks. But it pays off, and in Army aviation that isn't just so many points on the scoreboard.

Sure, professional football players play for keeps. Army aviators aren't exactly horsing around themselves. It's their own necks they are laying on the line and not only on Sunday afternoons, either.

COLD TURKEY

With that much at stake, it stands to reason that all airmen—especially commanders—spend a good part of their time worrying about the accident rate and taking positive steps to see it is reduced to the point of near invisibility. Everybody from bottom to top is taking part in a sustained team effort to make accidents, incidents and the like as rare as sled dogs in the Grand Bahamas.

If you happen to be in the mood for staring the brutal truth in the not-so-pretty face, the answer is—well, not exactly.

Far from it, in fact.

If you have been in the Army long enough you have probably heard about enough accidents, or have seen them, or have been in one yourself, not to need proof of the statement that the accident prevention problem isn't always being handled with the zeal its seriousness demands. For instance, in 1968, approximately 20 percent of the Army aircraft in Vietnam were destroyed or damaged in noncombat accidents. That's one out of five, in case you aren't very good at arithmetic, and remember, there were a good many people involved.

The fact is that some managers are better than others . . .

You'd also think these grisly figures would have prompted an all-out effort to bring them down. If you still want the truth, they haven't. In 1969, the total cost of noncombat accidents was approximately $150 million. What's equally to the point, despite the fact that well-intentioned people like the folks at USABAAR have been harping on the subject of safety night and day to anybody who would listen, there hasn't been any dramatic drop in accident levels over the past several years.

While the truth is still hanging around waiting for anybody with enough nerve to face it, let's ask what lies behind this deplorable state of affairs.

The answer is simple but painful.

Substandard performance.

Nobody likes to think his performance is the kind that would get him kicked off the squad by any coach with a normal helping of professional self-respect, but there you have it. Virtually every accident stems from the fact that somewhere, some place, some

time, somebody failed to deliver the goods the way he was supposed to.

Okay, so nobody's perfect. Everybody can be expected to goof once in awhile. A pattern of substandard behavior in Army aviation units is something else again. It's a fact that some units have had a consistently higher accident rate than others. In every instance you will find that the one with the higher rate is lacking an imaginative and soundly operated accident prevention program.

And what's the secret, if any, of a smooth-working and successful prevention program?

Sound management.

VIEW FROM THE TOP

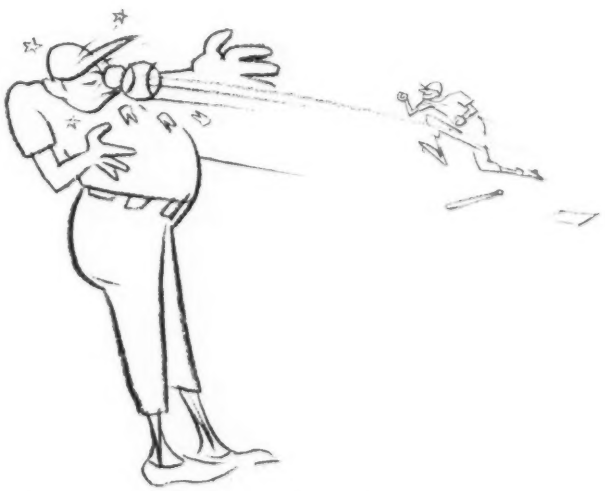
The big word in military circles from the days of Alexander the Great has been *leadership*. Let's not knock leadership, either. Nobody in his right mind would send a Boy Scout patrol on an overnight hike without some responsible soul in charge to see that they didn't get lost in the wilds. We might still be hanging on for dear life in Normandy if it hadn't been for the likes of Eisenhower, Bradley and Patton.

Management is something else—a function of leadership which some commanders can overlook or, at best, delegate as a subsidiary job to a subordinate who already has about as much on his plate as he can chew.

When it comes to accident prevention in Army aviation, management is nothing more than *command emphasis* on a *constant* and *coordinated* program to eliminate any substandard performance which can be remotely considered eliminatable. If you want to call it gentle arm-twisting, go ahead. Whatever its name, it is designed to promote procedures which, in combat or out, will keep performance values up to maximum levels.

Naturally it has to start at the top. Nothing of much lasting value comes out of anything, including matrimony, without some deep thinking being done in advance. The chap on the assembly line in an automobile factory has a function the factory couldn't do without, but it's the people on the management level who got the line started in the first place and who keep it rolling along like Ol' Man River.

The process begins with a long, honest look at the unit's problem areas. And, as long as we are being so honest, we might as well change that to its shortcomings. You can pretty up a shortcoming by calling it a problem area if you want, but it is still a shortcoming. Suppose there have been several wire strikes while the unit just down the road hasn't had any. Or foreign object damage is high. Or too



Coaches don't end up with the lumps and bruises, but they work about twice as hard . . .

many engine failures. One thing's for sure. They aren't just happening for no reason at all. Something is causing the trouble and will keep on causing it, until it is rooted out like crabgrass from a lawn.

And this takes thinking. Thinking and constructive action.

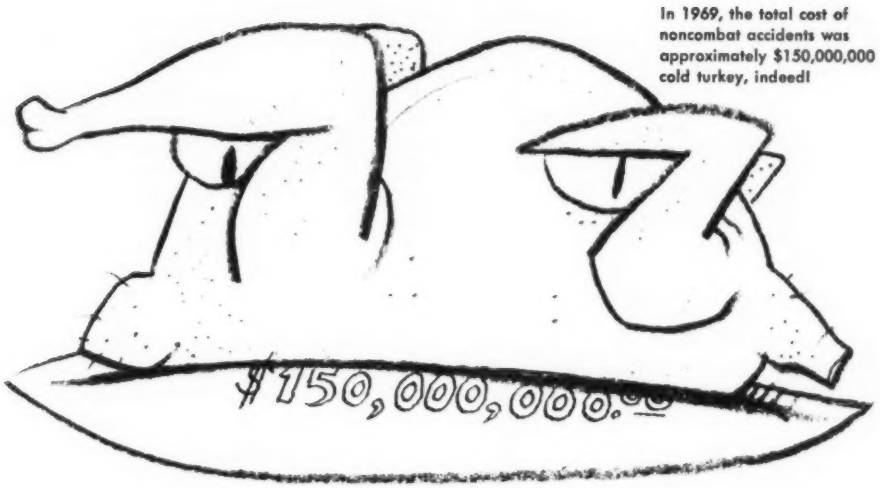
Plus sympathetic understanding of the multitude of problems every particular airman encounters in his particular job on any given day.

There's this, too. A sound accident prevention program, based on this kind of constructive approach, isn't a crash, gung ho affair, like National Cleanup Week or a community drive to raise money for a home for wayward girls and boys. It's as well-rounded as Raquel Welch and once it is started it keeps going.

A lot goes into the mixture that fuels it. Training and more training, even under difficult conditions. Discipline, pilot qualifications and flying proficiency. By-the-book maintenance procedures. Elimination of unnecessary hazards. Adequate medical and psychiatric supervision. Maximum crew rest possible. Ferret-like supervision. Encouragement of unit pride in its safety record. That's enough for a starter and it's no small order, either.

Take the matter of pilot training and proficiency. In a recent survey, nearly 60 percent of all accidents

It starts at the top, and it's a seven-day a week, year-around job



In 1969, the total cost of noncombat accidents was approximately $150,000,000 . . . cold turkey, indeed!

were laid at the door of that old bugaboo, *pilot error*. Faulty judgment on the pilot's part, a lot of the boards concluded.

But what lay behind the error? *What* and usually *who* was the basic cause of the accident? If a man lacked enough experience to do the job he was called on to do, who put him in the cockpit in the first place and who called on him to perform the mission?

Lack of judgment comes from inexperience or failure to understand the problems involved in a particular task. Or such other factors as fatigue, inadequate crew training, pressure, sickness or mental collywobbles. No matter what, the direct responsibility for the performance and safety of any operation lies with the supervisor—beg pardon, *manager,* that is. If he doesn't know his men and have a good line on their experience and general state of well-being, he is likely to plunge some unfortunate soul into water hot enough to parboil a rogue elephant.

So bad judgment in the cockpit can come from bad judgment—another way of saying lack of sound thinking—on the management level. Sometimes *that* stems from an overwhelming compulsion to get a job done, which is a praiseworthy attitude *provided the job can be done at all.* There's a TV show called Mission Impossible. In the big world outside the boob tube, where the bullets and the rice paddies and the density altitudes are for real, it's another matter. When a mission is impossible, it is just that. An aircraft isn't going to lift one more pound than it is designed to; a human being can go only so long without getting a rest; and a powerplant which hasn't been given proper maintenance isn't going to respond when it's called on to give that extra ounce of effort.

When there's a resourceful management program going full blast, everything is kept within reasonable physical and mechanical limits. No commander orders a pilot to overload an aircraft in high D.A. conditions simply because he sees an empty seat. Restrictions imposed by load, distance, weather, terrain, the individual aircraft and its maintenance status, and the physical and mental state of the air crew are understood and obeyed.

You can't for instance, take a 20-year-old warrant officer fresh from Rucker and expect him to perform with the proficiency of a thousand-hour veteran. Sure, he'll give it the old college try when he's assigned a task which is over his head. Nobody is going to find fault with him for that. And an aggressive, flaming desire to win is one of the first things all coaches look for in a player. They are realists enough, though, to know that all the desire in the world isn't going to turn a man who weighs only 150 pounds into the middle linebacker for the Vikings. He might have a go at it if he had a coach dumb enough to use him, but he wouldn't be around after the first play from scrimmage.

In Army aviation, when the limits are exceeded for either men or machines because of lack of good management practices, any number of things can happen, all of them hairy. They not only *can,* they probably *will.*

CASUALTY LIST

For openers, take the case of one veteran pilot who had logged 2,300 hours, enough to put him in the Old Man Mose class when it came to experience. Sort of immune to pilot error accidents, you might think. You'd be thinking wrong. One day while he

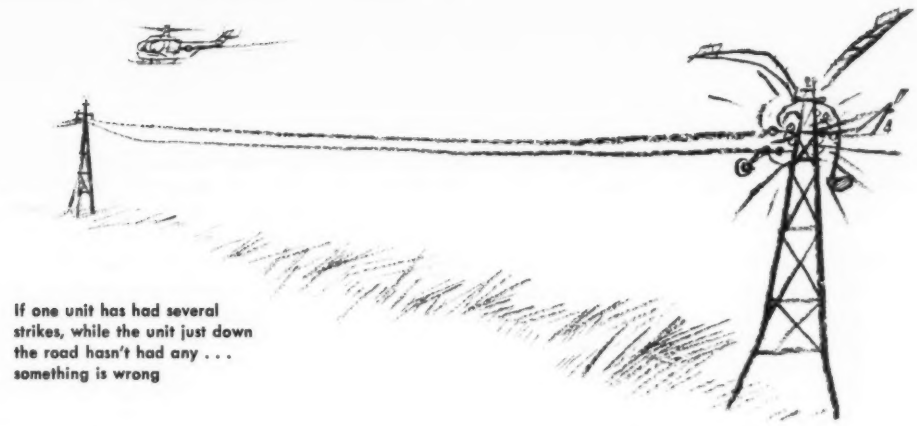
was flying a reconnaissance and inspection mission in uneven and only partly cleared terrain he caught a skid under a tree root on takeoff and was killed in the resulting crash.

Here's a clear case of pilot error—his failure to look for obstructions before takeoff. But—and it's a large but—he'd been tied down to a desk job and was rustier than the hinge on a barn door. His proficiency level had sunk to the point where he could no longer deliver the total performance flying an Army helicopter demands. Who made the biggest error—the pilot who paid with his life, or the commander who allowed him to go on the mission in the first place?

And how about the young warrant officer who crashed because a senior officer ordered him to load five extra men aboard in high density altitude conditions? We all know that the pilot had a right to refuse, but let's not kid ourselves. When higher rank speaks, not many youngsters are going to speak back.

In another instance, two young aviators with a combined total of 530 combat flying hours and almost no night experience were ordered by the special

Virtually every accident stems from the fact that somewhere, some place, some time, somebody failed to deliver the goods the way he was supposed to



If one unit has had several strikes, while the unit just down the road hasn't had any . . . something is wrong

forces group they were working under to fly an immediate resupply mission at 0230 hours. Fog and haze made weather conditions almost zero-zero and when they lost outside visual reference they promptly crashed and burned. They were doing their best, but their best wasn't good enough for a Mission Impossible which probably wasn't all that urgent anyway.

Moving right along, we come to the case of a Chinook called out at night in weather which would have driven an alligator under cover. The mission was to evacuate two men, one of whom had a broken arm and the other a machete wound. The wounded men, who could have waited until daylight, never did get evacuated because the Chinook flew into the side of a hill, killing all aboard.

By now you have the drift. In a high percentage of accidents there's a supervisory angle involved. The urgency of missions is overrated. Follow-the-leader, nonstandard procedures are condoned. Improper maintenance and supervisory procedures are overlooked. Revetments are not constructed and placed with thought to rotor strikes. Obstacles in the landing and takeoff paths aren't removed. A constant watch for potential FOD is not maintained.

It adds up to a lot of accidents. If the Army pilots ever get around to forming a union they might have a right to go on strike and start picketing as a protest against being saddled with the bulk of the blame.

BLOCK AND TACKLE

What it amounts to is a proper respect for the fundamentals. Even the coach at Minehaha High, Cold Corners, North Dakota, knows that if his players can't handle their blocking and tackling chores, his team stands a good chance of holding the longest losing streak in the history of the game.

Strict, unrelenting emphasis on sound execution of the fundamentals is the hallmark of every successful operation from football teams to the annual outing of the Fifth Ward Marching and Chowder Society. It is also a fact that the man in the driver's seat, the one who is doing the prodding, isn't likely to win any popularity contest. A coach who keeps his players on the field for hours of basic head-knocking drills is going to have some unkind things said about him in the dressing room. Everybody winds up mad at the chairman in charge of the annual outing even though it goes off smooth as cream because of the long hours he spent planning it.

It's all part of the job. An aviation commander who is as fussy as a mother hen about standard procedures for maintenance, foreign object damage, air crew proficiency, mission planning and all the rest of management's bag of tricks may not at first be appreciated by his men for the simple reason that attention to detail is hard work. No matter. The good aviation manager's overriding concern is to see that the men and machines in his outfit stay whole and healthy. If circumstances seemed to call for the use of branding irons and thumbscrews he might give the matter serious thought. Sooner rather than later, when the outfit wakes up to the fact that the accident rate is sinking like a Chinook in autorotation, they'll appreciate what he is doing for them.

One good thing about a program stressing fundamentals is that, though it is as unexciting as corned

The direct responsibility for the performance and safety of any operation lies with the manager

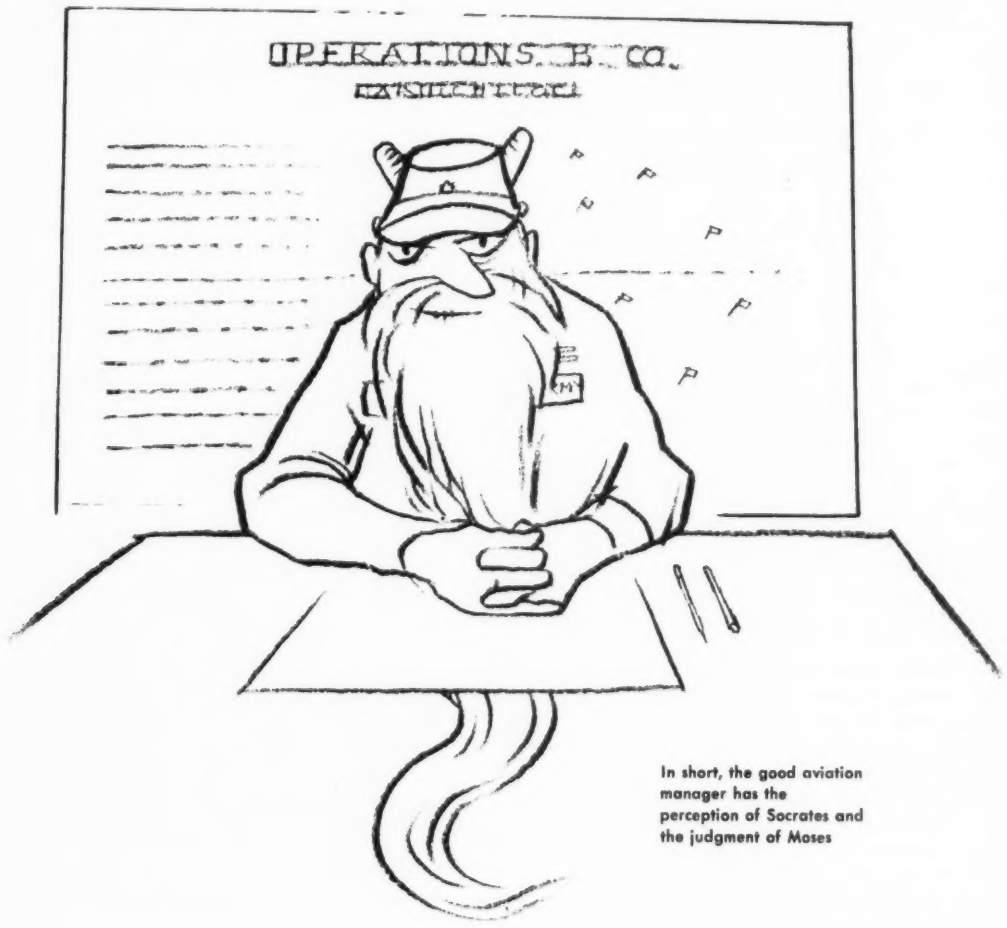
beef and cabbage, there's nothing very complicated about it. It is nothing more than a combination of by-the-book procedures and good, resourceful horse sense.

Proper evaluation of a mission's importance is one large area, as we've seen. Proper understanding by a ground commander of an aviation unit's problems is another. One recent accident involved an air crew on a resupply mission who had been flying almost continuously for 10½ hours in combat conditions. They were in no shape to carry out the one-hour extension requested by a battalion commander who had forgotten that the human frame can take only so much. So they crashed. Naturally. Mission Impossible.

Neither can aircraft take too much, particularly helicopters. Anything has its breaking point, naturally, but helicopters tend to develop nervous fits if you sneeze loud enough when you are around them. Proper maintenance is an absolute necessity. Or should be. Should be is right. One of the sad facts of life is that Army helicopters' failure rates, often brought on by poor maintenance practices, stand at a horrid 30 to 1 compared to that of fixed wing aircraft.

Who's to blame? The chap holding the torque wrench? Or a maintenance detachment commander who allows maintenance to be downgraded to provide extra time for support missions? Or, again, perhaps a commander who mismanages the use of the aviation unit's helicopters so that not enough time is allowed for the kind of maintenance a helicopter demands if it is to stay healthy?

Consider the all-too-typical day in the life of an



In short, the good aviation manager has the perception of Socrates and the judgment of Moses

aviation unit in combat. It is asked to arrive at a designated pickup point by daylight, but once it gets there the crews are required to remain on the alert for several hours before the mission gets underway and the troops are carried to wherever they are going. By this time, perhaps, the sun has gone behind the hills, but the choppers' long hard day isn't over. After dark, they are asked to fly supply missions and it's well after bedtime for both men and machine by the time they get back to their home base.

This is simple mismanagement of available resources by a commander who has failed to realize that helicopters require an ample amount of daylight down time at home during which maintenance can be performed. Advance planning which would eliminate the Hueys having to sit around twiddling their thumbs would give the guy with the torque wrench the opportunity to get the job done the way he has been trained to do it.

One thing's certain. A poorly serviced helicopter flown by a bone-tired crew isn't exactly an asset to have along on an operation. The loss of just one aircraft through noncombat causes can tip the scales in an engagement. Vince Lombardi isn't going to ask a place kicker who is running a fever and has one foot in a cast to try to boot a crucial field goal from 40 yards out. A sound aviation manager arranges things so that, in combat or out, crews and machines are in the best possible condition when they are called on to carry the ball.

ALL TOGETHER, NOW!

Sound management produces good teamwork and good teamwork produces team spirit, or high morale, or unit pride, or whatever you want to call it. Whatever the tag, it's the opposite of the glooms, that down-in-the-mouth attitude anybody can acquire if he gets the idea he is being badly handled and generally put-upon. A man likes to deliver his level best, but he has to be given an opportunity to show what he can do. He can get discouraged if he doesn't. And who really needs a discouraged airman? There are enough troubles right at hand without adding more.

It's also all too true that experience can sometimes be spread as thin as the soup in a second-rate boarding house. Maybe there'll never be a time when everybody in Army aviation has all the experience he can use. This is something any good manager, whether he's running a super market, a maintenance detachment or an aviation or ground unit keeps under advisement.

What it comes to is that maximum use can be made of what experience there is by resourceful,

Sound management produces team spirit, high morale and unit pride

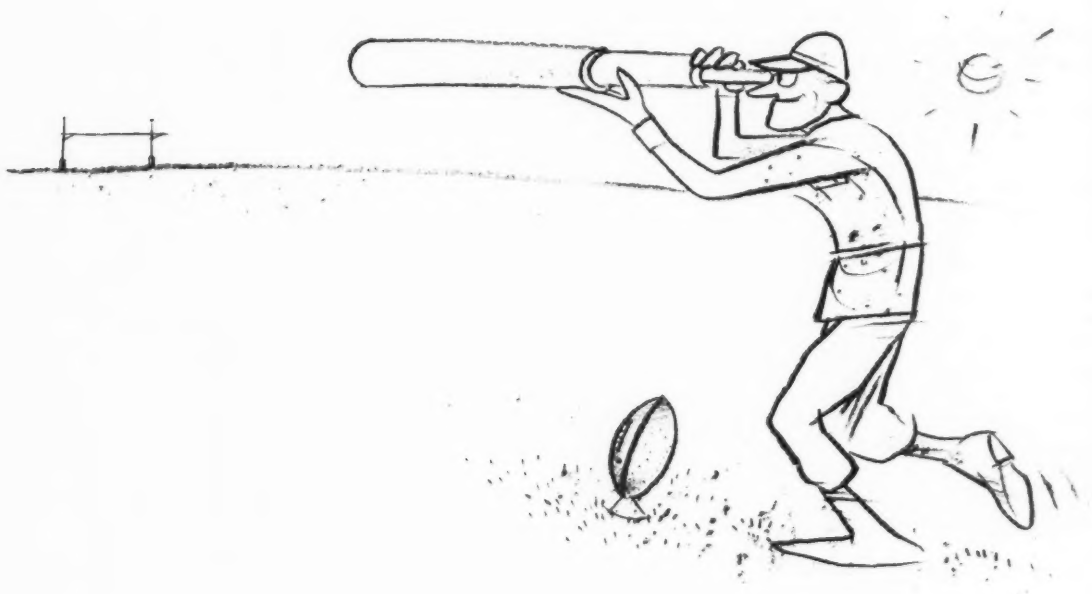
fixed, continuing and planned management programs, using by-the-book procedures which remove all possible hazards and which do not violate the physical limits beyond which men and machines cannot—repeat, *cannot*—safely be asked to go. Eight hours sleep, a hot meal and a loving letter from home aren't going to turn a 300-hour pilot into a 2,000-hour man, but he is going to perform a danged sight better than if he had to go without. And maybe a young mechanic still hasn't acquired the knowledge of the old hand who helped Wilbur and Orville bolt together what started it all down at Kitty Hawk. But the youngster will do okay if he has good, understanding supervision and knows the vital part that he and his tools play in keeping a helicopter in the air instead of sitting over in a corner of the field with its blades drooping and its tongue hanging out. Or worse, in the top of a tree about 20 miles the other side of nowhere.

So we can put sound aviation management somewhere up near the top of the goodies we'd like Santa to bring us. Only Christmas doesn't come every day, when good management is needed. Anyway, old Santa might bring you a candy cane and even a shiny new bicycle, but you can bet he isn't going to bring you a management program.

That's a do-it-yourself affair and there aren't any handy-dandy kits to do it with, either.

Planning, remember? Planning and a lot of deep thought.

Maybe today would be a good time to start, while the sun is still shining.



A SHORT COURSE IN HUMAN RELATIONS

The six most important words:

I ADMIT I MADE A MISTAKE

The five most important words:

YOU DID A GOOD JOB

The four most important words:

WHAT IS YOUR OPINION

The three most important words:

IF YOU PLEASE

The two most important words:

THANK YOU

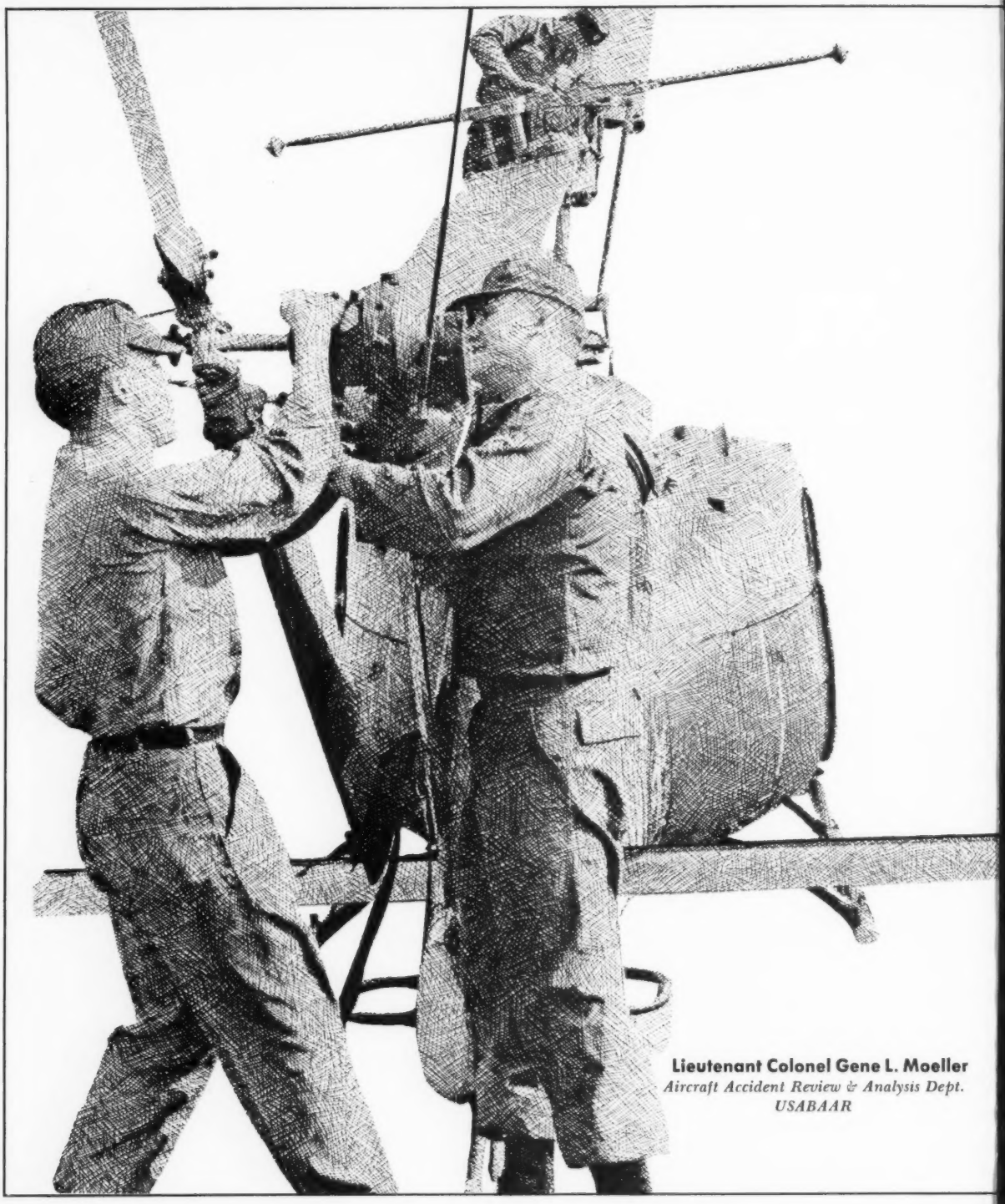
The one most important word:

WE

The least important word:

I

From MECH Naval Aviation Maintenance Safety Review, Summer 1970



Lieutenant Colonel Gene L. Moeller
Aircraft Accident Review & Analysis Dept.
USABAAR

Team Concept for Improved Maintenance

The combined efforts of maintenance specialists permit accurate and timely identification of problems before they become serious

TODAY OUR country is engaged in many and diverse activities, all important and costly. In addition to developing and maintaining new and sophisticated aircraft for tomorrow's defense, we must also maintain our present aircraft. Except for their present need, these could be considered out of date.

In Vietnam we have found guerilla warfare difficult and costly to combat. Two prime requisites of guerilla activity are mobility and aggressiveness. The guerilla can choose when and where to engage and disengage. These conditions require the deployment of far more fighting forces than would be necessary if the enemy could be brought to a decisive battle. Greater forces mean greater cost. Vietnam demands a variety of both combat and combat support missions. Some of these missions can be adaptations of what have, over the years, become traditional operations. Others must be called new tactics and perhaps new equipment is required to meet the peculiar geographic and military demands of a particular conflict and achieve specific objectives.

Consider equipment purchased for the Army—the cost of a single modern aircraft is many times the amount most of us will earn in a lifetime. The cost of a single item for an aircraft may represent more than we earn in several years. When we consider the cost of all the aviation-related equipment used by the Army, it staggers the imagination.

Records at USABAAR indicate maintenance actions are among the lesser causes of accidents. This tribute to maintenance technicians and supervisors should be a source of pride. However, there is another side to the picture. The same records indicate maintenance could be *first* in helping reduce the number of accidents. Certainly, quality maintenance becomes even more important as our aircraft become older and the service life of certain components is extended.

Routine system maintenance requirements are simple and clearly explained in maintenance handbooks. Regular inspections and maintenance are absolutely essential to ensure proper operation of the equipment. This point is made because aircraft and components are subjected to stresses, pressure surges of hydraulic pumps, heat, vibrations, temperature changes and contamination of systems. Signs of potential failure caused by these conditions can be recognized and corrected during the early stages, provided operation of the systems is fully understood by all maintenance personnel working on the aircraft.

Proper maintenance requires a knowledge of hydraulics, electronics and engine system operations, as well as an understanding of basic functions of the systems. Unit personnel have these skills and experience, but rarely is one person qualified in all of the areas. The combined efforts of specialists permit accurate and timely identification of problems before they become serious. The timing and positive control of maintenance actions is the professional approach to these problems. Professionalism is a must in maintenance systems analysis. The specialist method eliminates random uncoordinated efforts in clearing system discrepancies. This uncoordinated approach often results in failures to identify the true causes of problems. Such failures lead to repeated

Any maintenance man who is truly professional has the safety of the air crew first in his thoughts. This is brought out by the fact that maintenance-related cause factor accidents are among the lowest percentages of Army aircraft accidents

writeups and create safety-of-flight hazards. Repeated writeups of a system must be considered danger signs.

The importance of thorough preflights cannot be overstressed. These inspections are intended to check aircraft systems. They must be complete, without being unduly time-consuming. A few things that can make the difference between success and failure are interpreting a gauge, instead of glancing to see if it is in the green; bleeding the air in the hydraulic system, instead of adding more fluid; and checking to see if a component is leaking, instead of assuming that it is an overflow. Aviators and maintenance personnel who have been in the business a long time know these factors. Maintenance people who are true professionals and know the systems will recognize a sick bird. Those few extra minutes during preflight may well prevent later trouble that will cause a mission abort.

Postflights are the point where pilots and maintenance personnel start to work on problems noted in writeups. The best time for an aviator to explain or demonstrate the exact nature of a discrepancy is prior to shutdown. Often such a demonstration will suggest other possible maintenance items that may not have been apparent to the aviator alone.

Debriefings should be team efforts of aviators, crew chiefs and specialists. Crew chiefs and specialists should get together with aviators to make sure problems are understood and that all significant information is recorded in writeups.

Writeups by pilots have been criticized for being too vague and containing little information (i.e., engine mission, low rotor rpm, chip detector light came on, etc.). Some writeup problems come from such things as a different interpretation of the same word, vague or ambiguous phrases and inadequate descriptions of malfunctions. These problems can be overcome by a coordinated effort on the part of aviators and maintenance personnel.

The Army has spent large sums of money updating and upgrading technical data for its aircraft. It is essential that everyone working on these aircraft adhere strictly to this information. If the material or newly published changes are not clear, personnel should initiate action to advise the proponent agency of the shortcomings. Personnel in the field must provide suggestions about how the material or instructions can be improved or clarified. Make your problem known.

Seldom is much thought given to the many hours that maintenance and maintenance-affiliated personnel have contributed to ensure the safety of air crews. Any maintenance man who is truly professional has the safety of the air crew first in his thoughts. This is brought out by the fact that maintenance-related cause factor accidents are among the lower percentages of Army aircraft accidents. Rigid training which teaches pilots to cope with in-flight emergencies and make comprehensible write-ups which will enable the maintenance personnel to take effective corrective actions is highly important to the aviation accident prevention program. However, all the training the aviators can absorb will not ensure safe flights without constant attention given details by the maintenance personnel. Without this attention, the next best training for pilots would be more intensive survival training.

Maintenance personnel depend on the aviators to let them know what went wrong during flights. They also depend on the quality and variety of education and training tucked under their caps. The quality and amount of supervision they receive must also be considered. Supervisors must provide this ingredient to back and have effective maintenance teams.

What many aviators fail to see is the proud expression on a mechanic's grease-smeared face when aircraft that caused him extra work are safely airborne, or his wide grin and satisfied nod as a flight returns safely. There remains no trace then of bitterness at having to work extra long hours—just the proud smile of mission accomplished.

CHEATING DEATH

"SO YOU CHEATED death again," laughed Sam as he and Jim met for a beer in the club after the day's flight. This had been a longstanding joke among the oldtime pilots of the Bengals.

The Bengals were a darned good outfit and proclaimed it loudly, both at the bar and by virtue of a 9,000-hour accident-free flying record. Jim was proud of his outfit and proud of the flying record, as he was the safety officer. To him, cheating death was no joke. Jim was due to return to the good old USA in just 28 days for a joyful reunion with his family and friends. It had not been easy during the 11 months and 971 combat hours that were now behind him.

Sam was a young pilot, but a good one. He had a high regard for Jim who was considerably senior as a pilot and in age.

"Yeah, we both cheated death again," said Jim as he mentally relived the past year the two had been together. "Sam," he said, clapping his hand on his young friend's shoulder, "you may think of it as cheating death. I like to think of it as causing safety to happen. You may have heard the expression 'accidents don't just happen—they are caused.' The same can be said for safety—it doesn't just happen—it is caused."

"How do you figure that?" asked Sam.

Jim reflected for a moment trying to select the right words. "Very few people ever live their entire lives without breaking a bone or getting hurt in some way or another. When you were a kid and fell and skinned your knee, you remembered it. Whether you realized it or not, you were developing a small part of the attitude toward safety that you have today. As you grew older, you learned to identify *potential* hazards and do something to prevent them from hurting you or someone else."

"Gee, I never thought of it like that before," said Sam. "Tell me more."

"O.K.," said Jim, warming to his subject. "As normal human beings, we are all given to making mistakes. That's why erasers are put on pencils. Some mistakes are simple to correct. Others are not. Your attitude toward safety governs the number of mistakes you make. Whether you are flying an airplane or taking a shower in your bathtub, you should always be aware of your own limitations and existing potential hazards."

"I see what you mean," said Sam, "but there are some hazards we can't possibly foresee."

"That's true," Jim replied, "but we can minimize those by doing things in the safest possible manner. Try to think of it as giving yourself an alternative or a way out, no matter what suddenly pops up."

"You know," Sam said, "I've always tried to do things in a safe manner, but didn't realize why until now. Those guys who take unnecessary chances are really stacking the deck against themselves."

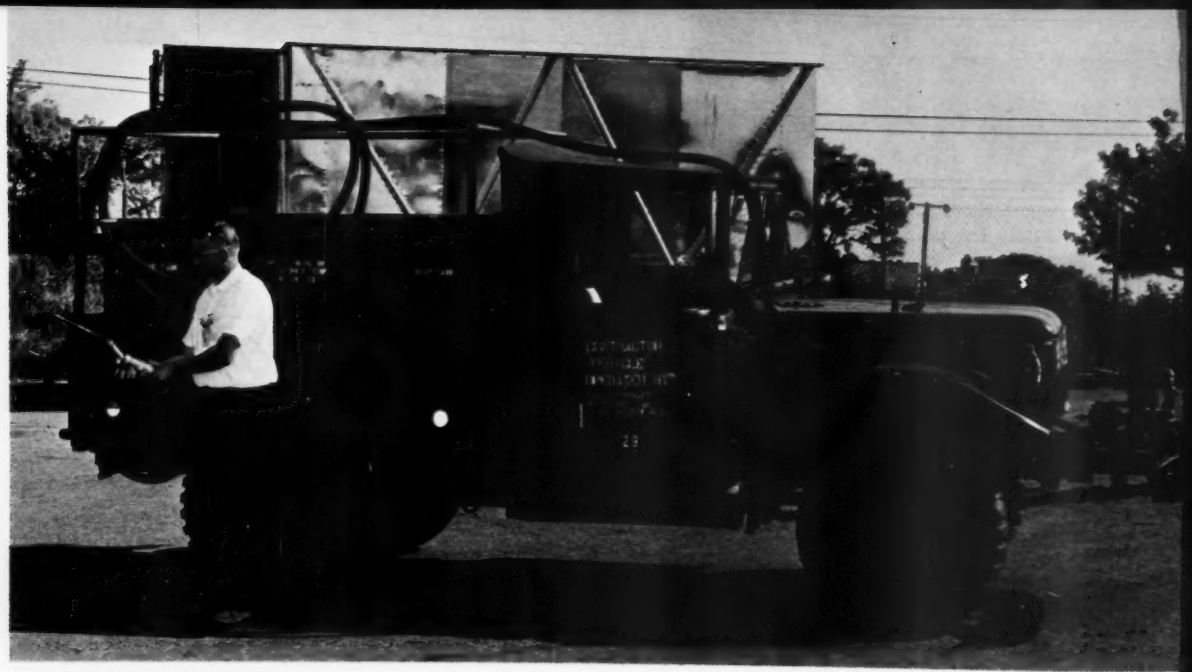
"Yep, that's about the size of it," Jim agreed. "Those guys are always around, but not for long. Sometimes they make it if they live long enough to wise up."

"Hey, Joe, two more beers!" Sam called. "This one's on me."

Jim sipped his beer and thought about what he had said. Attitudes toward safety are formed in your childhood. No one is accident prone unless they are homegrown that way. The situations in which you allow yourself to become involved are of your own making. There are certain things that a man has to do, but there are others that he feels compelled to do that are not really necessary. Why? Who knows?

Adapted from the AMC SAFETY DIGEST

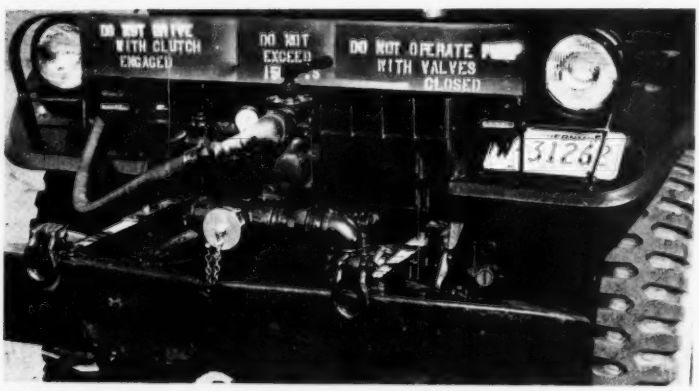
CW4 Henry A. Powell
Safety Officer, USAAVNTBD



Ray Wimberly, shop foreman, checks spray nozzle before testing recently completed washer unit

Solutions to Army aviation problems are best found through . . .

Team Effort



Closeup of pump installation shows modification of front bumper. Pump pressure was reduced to 150 psi

Truck bed houses tanks. All controls, including selection of soap or rinse solution, are located in pump area, simplifying operator's job

Ted Kontos

THE NEED FOR teamwork is not new. As kids, we realized its importance on the baseball diamond, football field and basketball court. In Army aviation, we are particularly aware of the need for effective teamwork between air and ground crews. But teamwork is equally essential between pilots and control tower operators, weather personnel, airfield maintenance crews, flight surgeons, administrative and supply personnel, and a host of others far beyond the boundaries of any airfield. Just how far does this team effort extend? Who is included? Let's take a closer look.

Mr. Ray Wimberly is employed by Page Aircraft Maintenance, Inc. (PAMI), Ft. Rucker. As a foreman, he is naturally concerned with all necessary functions for timely and efficient operation of the shops under his supervision. But his concern for the Army aviation program extends beyond his assigned areas of responsibility. Although remote from the flight line, he knows that keeping aircraft clean at the airfields in the Ft. Rucker complex is a necessary but difficult task. Dirt is a nuisance and a threat to aircraft reliability and air crew safety. Dirt can mask defects, permitting them to go undetected during preflight inspections. It causes foreign object damage to engines; contaminates fuel, oil and hydraulic systems; causes parts to wear out prematurely; prevents operation of intricate components; clogs pitot and static ports; damages plexiglass; and reduces pilot visibility.

Although washrack facilities are available at all major Ft. Rucker airfields, they cannot effectively meet the demand placed on them. The total number of aircraft they can accommodate during any given period of time is limited. Time is lost taxiing or towing aircraft to and from wash areas and many aircraft operate from remote airfields which have no facilities for cleaning aircraft. Other aircraft, particularly helicopters, operate from field sites and have no access to wash areas. Wimberly decided a supplementary means for cleaning aircraft should be found.

A portable washer unit which could be readily moved from one aircraft to another seemed the best solution. This would eliminate the need for towing aircraft, saving time and effort. But the purchase of such equipment would require considerable funding and most portable units, designed to be used primarily on prepared airfields, are not suitable for frequent road use.

Wimberly decided a completely self-contained unit was needed—one that could be assembled from equipment available in the Army inventory. He obtained authorization and began to put his idea into action. For a carrier, he selected a 3/4-ton vehicle which offered ample ground clearance for use over unimproved terrain, could haul a heavy load, was suitable for highway travel and was rugged enough to withstand continued use with minimum upkeep. Next, he chose a type H fire pump and extended the front bumper to permit mounting. Soap solution and rinse tanks were fabricated and mounted on the carrier bed. Finally, valves, pipes, hoses, connectors and other plumbing components were installed. The unit was serviced, tested and put into operation. The results surpassed Wimberly's expectations. Benefits included rapid availability of unit where needed; elimination of towing vehicles and equipment; a decrease in the number of personnel required; increased productivity; a decrease in operational costs; and results comparable to those produced by permanent type washrack facilities.

The portable washer unit is also highly versatile. It can be used to flush away spilled fuel, to clean paved ramps or other areas and to help extinguish fires on which water can be used. During winter operations, it can be serviced with anti-icing fluid and used to melt frost and ice off aircraft. If the need arises, the tanks can be filled with solvent for cleaning engines.

At one airfield use of the portable washer has resulted in saving 16 man-hours each day. Three additional units have been completed and placed in

Unit is operationally checked before being placed in service

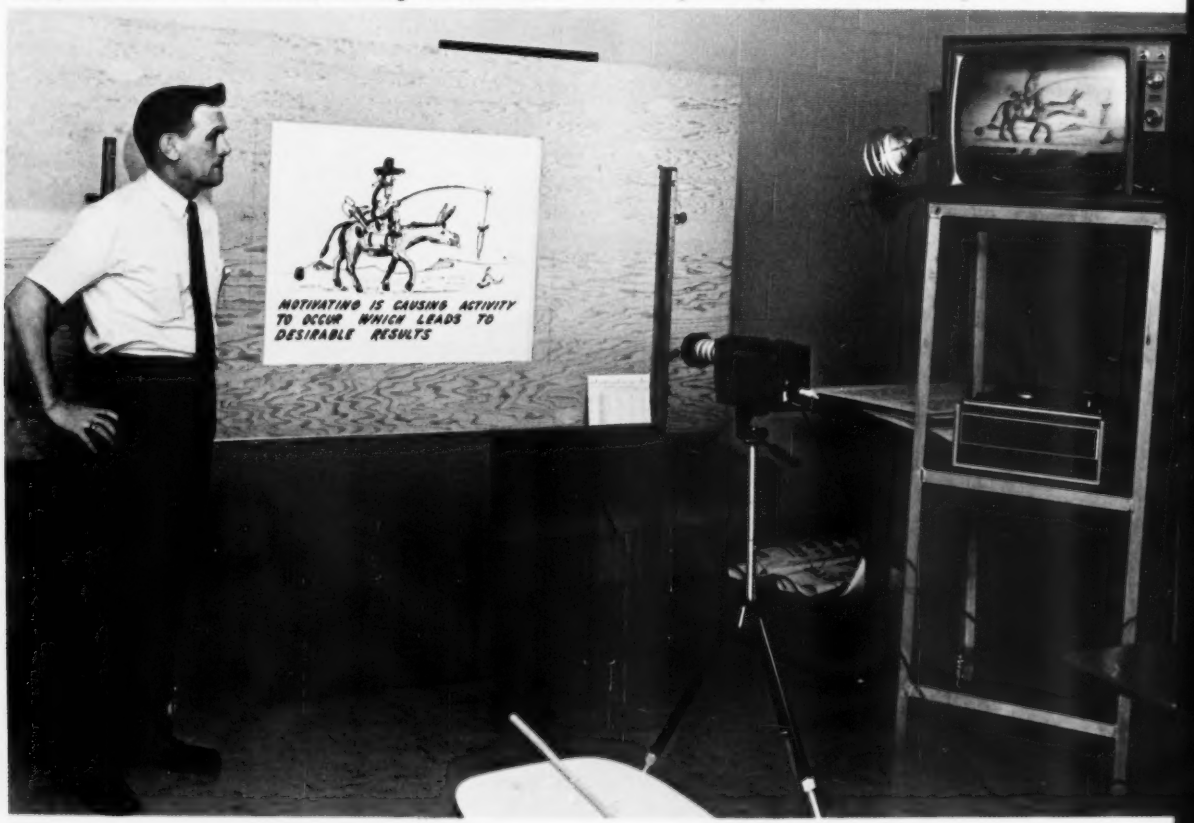
TEAM EFFORT

service at Ft. Rucker airfields. Eight more have been requested—all because of one man's interest in his team.

In another instance, to improve maintenance and related contract services, PAMI management personnel searched for a way to provide employees with timely information related to specific job functions. Their objectives included improved methods for orienting new personnel; safety promotion; rapid dissemination of information about problem areas and solutions, as well as changes in equipment and procedures; correct compliance with MWOs; elimination of errors; standardization of procedures; and increased efficiency. They sought a highly versatile training program applicable to all job fields within the organization. Collectively, they arrived at a remarkably simple and effective solution.

Since analysis showed the basic problem concerned a rapid means of communication, why not use the most modern means of communication available, television. Mr. N. T. Pilgreen, industrial engineer, and Mr. T. E. Watson, training coordinator, were assigned the task. Their job was to develop and prepare timely programs and present them to personnel at their work sites. Armed with a portable TV camera, recorder, monitor and a self-supporting van for mobility, Pilgreen and Watson went to work. In the four short months since its inception, this training program has been judged one of the most effective and receptive devised. Its advantages are numerous:

- The need for preparing courses of instruction, including lesson plans and training aids, is eliminated. Portability of the system permits rapid recording of any subject or procedure on location for immediate use.
- Personnel receive information at work sites, reducing time lost from duties.
- Step-by-step procedures concerning specific problems can be recorded, then presented as many times as necessary to ensure all personnel receive the information and understand the problems and remedial actions required. One tape was shown 26 times.
- Subject matter is unlimited. Although currently directed primarily at maintenance personnel, this



system can be used with equal effectiveness to inform or instruct administrative, supply or other personnel, as the need arises. Programs completed and in use include orientation of personnel, safety procedures for personnel operating vehicles in the vicinity of aircraft, a standardization course on the correct preparation and maintenance of aircraft forms and records and step-by-step maintenance procedures for specific aircraft components. One proposed use is the recording of Urgent Action MWO procedures, permitting mechanics to see and understand how the work is to be accomplished before they work on aircraft.

From a small beginning, this training program has grown to the degree that serious consideration is being given to establishing a centrally located transmitting station with monitors permanently located at selected sites. In this way, pertinent information can be made more readily available to all personnel.

How far does the Army aviation team effort extend? Who is included? It reaches into every area of Army aviation, no matter how remote it may seem to be. And it includes *you*. As a matter of fact, *you* are the most important player on this team. Knowing your job and doing it correctly is the best way you can support your team. Keeping other members informed of known problems, cures, new ideas and developments is another way you can improve your team's efficiency. Your efforts and continued interest in aviation will enhance your team's welfare and keep it winning.

Framed on easel, DA form is taped. Narration will be dubbed in later

T. E. Watson, training coordinator, demonstrates simplicity of system. Recorder stores image and sound on tape for later transmission over receiver being used as monitor. Camera, recorder and monitor comprise basic system. Classroom doubles as studio

(13) Describe any known or susp
maintenance or inspection factors.

(14) Describe any known or suspected ma-
teriel deficiencies. Give the control number of
DA Form 2407 (Maintenance Request) per-
taining to Section III—Equipment Improve-
ment Recommendation (EIR). Give complete
FSN, part number and nomenclature of the
suspected or failed part and the name of the
publication from which this information was
obtained. If engine failure or malfunction is a
factor, submit engine model, series, serial num-
ber, total time, time since overhaul (report
time to nearest hour), overhaul facility and
date of last overhaul, previous storage history,
cause of failure, power settings and significant
engine indications.

Note. If the word "suspected" is used in the
ash facts message, the supplem

SATISFYING A REQUIREMENT

CW4 Paul L. Pagano
Aircraft Accident Review & Analysis Dept.
USABAAR

"Nothing can come out of nothing, any more than a thing can go back to nothing"

MARCUS ANTONIOUS

THE DUTY OFFICER was bored, bored as only that unfortunate group of individuals can be whose number has come up on a duty roster for a weekend tour of duty. He'd already read all the old ADAM, MAD and PLAYBOY magazines that collect in duty officers' desks. Mad because no one had left new issues since his last tour of duty, he slammed the drawer closed. The telephone jangled its demanding sound into the silent room. "Airfield operations, duty officer speaking! . . . Lieutenant who? . . . You say you had a precautionary landing? . . . No damage and no one hurt. . . . What are you calling me for?

"You say I'm supposed to call in a crash facts message? O.K., give me the poop."

The duty officer scribbled a few notes, hung up the phone and started digging through his duty officer instructions. He found a tab referring to mishap reporting and started reading. Confused, he mentally complained about weekend pilots and wondered why the idiot was flying during offduty hours. He read on about what to do in case of a mishap and found a standard message form where he only had to fill in the blanks.

He remembered hearing something in the past about having 8 duty hours to send the message and weekend duty, as far as he was concerned, was not duty hours. Regardless, he knew he was stuck with filling it out and sending it because the duty officer instructions called for electrical transmittal of the message immediately upon receipt of the information and he didn't go off duty for another 20 hours. The commo room was open on weekends so he could expect no problem there. He started filling in the blocks on the form, going by the instruction sheet. He was glad to have a little something to do to help break the monotony. Things went fine until he came to item 14 of the message form, which required him to list any known or suspected materiel deficiencies. He read the notes he had taken when the pilot called him.

"Let's see now, the lieutenant said he had a high cylinder head temperature reading, so he landed before the engine quit. He was in the traffic pattern, so the helicopter is located on the airfield and properly secured. I'll put, 'Pilot noted high cylinder head temperature reading and landed. Suspect engine malfunction.' Now, I'll get this to the commo room."

Bright and early Monday morning, the lieutenant who had the precautionary landing could hardly wait to tell the maintenance officer he'd had problems with one of his aircraft and how he, the lieutenant, had saved the day by being alert. The veteran maintenance officer grumbled about not being notified the day before so he could have had it repaired for Monday. He sent a crew to bring the helicopter into the hangar where his men could go to work on it. Two hours later, he checked with the maintenance NCO to learn what was found wrong. The maintenance NCO said the cooling fan gearbox had failed, putting the cooling fan out of operation and causing the engine to overheat. The NCO also stated he would have it back on the line by 1300. The maintenance officer complained about sending in two EIRs on the same item in the past without hearing of any word or action from higher headquarters about them. He hopped into his car and drove to the housing area for lunch.

This didn't happen, but the remarks in item 14 of the crash facts message are typical, whether made by a weekend duty officer or someone else during duty hours. Correct reporting procedures are contained in paragraph 4-2e, chapter 4, AR 385-40. Item 14 of the crash facts message was almost completely ignored by the duty officer in this story. He had satisfied a requirement and sent the message on its way within the required time limit.

All contents of a crash facts message are of equal importance. The real meat of the messages for collecting data trends in the area of parts failure, however, is contained in item 14. Trends in materiel and engine malfunctions or failures indicate problem areas in need of correction. Incorrect, incomplete or the total absence of required data in this portion of crash facts messages defeats one of the primary purposes of the crash facts message report. Many crash facts messages contain the nomenclature or description of a component or system, such as "Cooling fan failed," when, in reality, a *portion* of the system failed (i.e., gearbox, fan blade, coupling, etc.). The federal stock number reported for a part that failed, in all too many messages, indicates a part with no relation to the failed component or system, and one that is completely removed from the area

in question. For example, a particular bolt failed in the tail rotor system, but the federal stock number reported for the bolt indicated it was located in the main rotor system.

How can you help? Remember to always give the complete FSN, part number and nomenclature of the failed or suspected part and the name of the publication from which the information was obtained. If engine failure or malfunction is a factor, submit the engine model, series, serial number, total time, time since overhaul (report time to nearest hour), overhaul facility and the date of last overhaul, previous storage history, cause of failure, power settings and significant engine indications.

The unit safety officer or someone in this fictitious case should have ensured that a supplemental message giving full information about the failed part was dispatched. Instructions for completing item 14 of the crash facts message state that if the word *suspected* is used in the original crash facts message, a supplemental message will provide correct information concerning the failure or deficiency. Where no failure or deficiency is found, a negative reply is required.

In summary, reporting aircraft accidents or other mishaps is an integral part of each unit's aviation accident prevention program. Delay or failure to report properly deprives the overall Army aviation accident prevention program of vital data, experiences and, in some instances, knowledge of a dangerous situation that may affect an entire fleet of a particular type of aircraft. Accurate and timely reporting provides the basis for effective action to prevent future accidents and other mishaps.

Checklists: Who Needs Them?

Lieutenant Colonel Gene L. Moeller
Aircraft Accident Review & Analysis Dept., USABAAR

HOW MANY TIMES have you heard the remark, "I've flown this aircraft so much, I know the checklist by memory," or "I don't have the time. Besides, they go into too much detail." With this attitude, we are not the professionals we tend to think we are.

There is no need to dwell upon the purpose of the checklist or the requirement for its use. Many manhours, dollars and time are involved in compiling, verifying and publishing them. We now have the dash 10 CL to help standardize checklist procedures Army-wide. There is no real method to determine the number of accidents or mishaps that have been prevented when the *complete* checklist was used. If you follow the checklist conscientiously each time it is required, you are a professional. Now you must become a teacher to those semi-pros who don't.

Negligence is a disturbing word in aviation circles. Jeopardizing your career just doesn't make good sense. This is a blunt way of putting it, but these are the facts you must face when you deviate from the requirement to use the checklist.

Commanders, supervisory and safety personnel are rightly concerned about this type of negligence. Had correct checklist procedures been followed, many mishaps costing lives, combat effectiveness and millions of dollars could have been prevented.

This also pertains to the maintenance personnel. There are precise procedures to follow when performing aircraft maintenance. Deliberately omitting any steps in these procedures can only be labeled *negligence*.

What can be done to ensure proper checklist compliance? A major solution is to apply on-the-spot corrective action when failure to follow the checklist occurs. Failure to comply may be the result of a number of circumstances, including distraction, preoccupation or just plain carelessness. Others could be described as deliberate acts of negligence, though innocent of any intent to cause mishaps.

Training programs involving the use of checklists must stress the possible effects of distraction and preoccupations. Programs of retraining and education may be adequate for correcting such factors when they occur, but disciplinary action is usually needed whenever acts of negligence happen.

Safety is a required goal in the Army aviation program. Discipline in attaining and maintaining this goal is a prime factor. If discipline is lacking in the use of checklists, we possibly lack discipline in other areas as well. Safety is everyone's business, from the commander to the lowest rank. Who knows —you may be the passenger when the pilot or crew chief didn't think they had time to use the required checklists. Are you using discipline to stamp out negligence and irresponsibility in your unit?

CHOPPER TALK

Patsy R. Thompson
Education and Prevention Department
USABAAR

AN OH-6 AND A CH-47 idling on the ramp were watching other aircraft on the runway. "Gad, it's hot!" exclaimed the OH-6. "It must be at least 140 degrees. It's a good thing I'm made of metal or I'd probably be court-martialed for sunburn."

"Yeah," replied the Chinook. "Look at the heat vapors rising off this asphalt. If it wasn't for the breeze from the rotorwash of my sisters, this heat would be unbearable. My new paint job won't last long under these rays. It feels like it's blistering already."

"Hey, did you see that?" asked the OH-6.

"What?"

"The rotorwash from that hovering Chinook caught the main rotor blades of the LOH shutting down on the parking apron. Get a load of its tail boom. That's the fourth helicopter injured this month because of the poor design of this airfield!"

"That's news to me," the Chinook replied. "Evidently, I was off on a mission when they were hurt. What happened?"

"They put up some more revetments a couple of weeks ago. Unfortunately, some absentminded human left a loose sandbag lying in the open. A Chinook was hovering at 10 feet and the sandbag blew up into its rotor blades, injuring one. She was towed to the maintenance hospital and given a new blade, which cost Uncle Sam $9,500.

"The second happened when an LOH was being fed in the POL cafeteria located beside the runway. At the same time, an ailing Bird Dog made an emergency landing, veered off the runway and plowed through the POL area. That poor little LOH didn't stand a chance. It was rushed to the hospital, but pronounced dead on arrival. This fatality was avoidable! Our POL area is entirely too close to the runway. Whoever designed this airfield evidently wasn't aware of layout requirements in TM 5-823-1.

"The third injury involved a Chinook and a pickup truck. The ground controller gave the truck the go-ahead to cross the active runway. At about the same moment, the tower operator cleared the Chinook on a different frequency for landing. The inevitable happened and there was the loudest racket I've ever heard. The rescue squad screamed to the scene, but the poor Chinook and truck were eternally mated into a mass of metal." The OH-6 sighed. "Poor control is undoubtedly worse than none at all."

"I swear, if they don't shape up around here, I'm gonna pull the ole sick act!" cried the Chinook. "Maybe it'll get me out of here until things get better." The Chinook gracefully drew up its ramp. "What these people need to do is use the new *Guide to Aviation Resources Management for Aircraft Mishap Prevention.* That's the one which supersedes the 11th edition of the *Army Aircraft Accident Prevention Survey* booklet. I'm sure copies are available because USABAAR distributed it with the Weekly Summary during April.

"This publication contains guidelines for airfield facilities. It also covers all areas of the aviation accident prevention effort. It was designed for use by commanders, staff officers and leaders of the varied activities in Army aviation to isolate potential hazards. Although not intended as a cure-all for all aivation accident prevention problems, it provides many valuable considerations for effective management—the only method by which aviation assets can be controlled."

"Man that's groovy!" exclaimed the OH-6. "Let's hope our managers take advantage of the guidance contained in this publication."

Copies of the *Guide to Aviation Resources Management for Aircraft Mishap Prevention* may be obtained by writing to Director, USABAAR, ATTN: E&P, Ft. Rucker, Ala. 36360. Direct communication authorized by AR 15-76.

ANNUAL
AWARD
Monthly Winner
CONTEST

CW3 Arel E. Childress
Aircraft Accident Review and Analysis Department
USABAAR

From January 1967 to March 1970, six accidents occurred in cargo helicopters due to overgross conditions. These accidents resulted in 62 fatalities, 99 injuries and a total damage cost of $2,784,645

PILOT ERROR?

IN A RECENT accident, five crew members were killed and their CH-47 destroyed. The accident occurred during climbout after an attempt to take off 4,000 pounds over gross weight. A previous takeoff attempt had been aborted and another attempt made with the same load.

At 1300, after shutdown for lunch and refueling, the CH-47 was hovered to the slingload area to resume the mission which had started that morning. The aircraft commander (AC) was directed to load and the hookup was made. After picking up the load, the AC called the hookup crew and requested an additional load. The additional load was attached and the combined weight was 14,000 pounds. After the second load was hooked, the helicopter rose to approximately a 10-foot hover and started moving forward to the active runway.

During takeoff, the helicopter started settling over the runway and the load contacted the ground. One of the loads began to break up and the CH-47 continued to settle. It came to rest in an extreme nose low attitude with the load under the aft section. The AC attempted another takeoff, the helicopter rose abruptly and the load was jerked from the ground. As it broke ground, the load swung violently forward, then began longitudinal and lateral oscillations. The Chinook continued to climb and veered to the right over a POL area. The load was manually released over the POL area, causing a minor fire. Altitude at the time of load release was approximately 200 feet and the helicopter appeared to be out of control. It climbed rapidly to approximately 500 feet, appeared to stabilize under control, then turned back toward the takeoff area, rolled inverted, crashed and burned.

Other relevant data:

1. Weather—CAVU, wind calm and OAT 95 degrees F.
2. Total weight—42,000 pounds.
3. Over gross—4,000 pounds.
4. The AC had been in the area 9 months and he had been an aircraft commander for 4 months. He was a unit IP and was said to have been an above average pilot. His R&R leave had been canceled 2 days before the accident. Other pilots in his unit said: "He carried double loads many times. . . ." "He had been taking double loads during the morning missions. . . ." "He was very confident in his ability and volunteered for all TAC-Es."
5. The pilot had been recently assigned to the unit.
6. The unit SOP called for a maximum load of 10,000 pounds.

Sound like fiction? It is, but a similar accident happened. What caused it? In the final analysis, you could say pilot error. However, there are several unanswered questions:

1. Why would an experienced AC attempt to take off 4,000 pounds over gross weight?
2. After losing power and settling on the load, why did he try a second takeoff?
3. It was common knowledge in the unit that the AC constantly carried loads that were too heavy and in violation of the unit SOP. Why didn't the other pilots report this?
4. Were the commanding officer, operations officer and safety officer unaware of this situation? Why?

These questions may never be answered, but there are measures that will prevent future accidents of

this type. Let's look at three areas involved in this accident:

Gross weight—An aircraft is designed for specific weight limitations which cannot be exceeded without compromising safety. Overloading an aircraft may cause structural failure or result in reduced engine and airframe life. Loading beyond the maximum gross weight limitation will have the following effects (extracted from TM 55-405-9, Weight and Balance):

1. Increased takeoff distance.
2. Reduced rate of climb.
3. Reduced cruising speed.
4. Increased stalling speed.
5. Reduced maneuverability.
6. Reduced range.
7. Reduced ceiling.
8. Increased landing distance.

From January 1967 to March 1970, six accidents occurred in cargo helicopters due to overgross conditions. These accidents resulted in 62 fatalities, 99 injuries and a total damage cost of $2,784,645.

Sometime in the future, we may have an instrument in the cockpit that will display gross weight, payload capability and available power. Until that time, we must rely on the knowledge and judgment of pilots. Since we all know how to compute weight and balance (?), how do we get into overgross conditions? It's not very hard if a few basic facts are ignored. Among these are:

1. How much extra weight (oil, hydraulic fluid, spare parts, tools, etc.) do you have in your aircraft that is not annotated on the 365 forms? One CH-47 unit safety officer answered, "About 150 pounds." An inventory of three of his helicopters revealed an average of 1,475 pounds each.

2. If your takeoff is from sea level and your landing is to be to a 5,000-foot peak, do you consider this when determining your load capabilities?

3. When moving troops, what figure do you use for their weight? Paragraph 42, TM 55-405-9, states the following: Combat-equipped soldier—240 pounds, combat-equipped paratrooper—260 pounds. Several units, when asked this question, said they were using 200 pounds. In the case of a CH-47A, this is 1,320 pounds of weight not accounted for.

4. Do you pride yourself in being able to carry a heavier load than the other pilots in your unit? If so, the inscription on your tomb may read, "Died from false pride."

There is a very good defense against overgross conditions. It can be used any time, in a tactical situation or out, and requires only a few seconds of your time. You don't need any manuals, charts or graphs. It's called a HOVER CHECK. Do you use it?

Behavior—A key to accident prevention. Your key to survival on the battle field is your behavior under fire, including alertness, coolness, courage, response to orders, skill, knowledge, fitness and teamwork. Doesn't this apply equally to flying?

For aircraft accident prevention, the question is not whether you *can* fly safely but whether you *will*. Investigations show that poor behavior contributes to accidents which could have been prevented by proper behavior. The old adage, "Familiarity breeds contempt," is especially true in accident prevention. Newly rated aviators usually show care and stick closely to the rules. However, as they gain experience, some of these pilots (you, perhaps?) take needless chances or shortcuts. Confidence grows each time an aviator escapes a near mishap. When this happens, he's likely to continue to take chances—until an accident occurs.

Behavior leading to accidents often reveals itself

When moving troops, what figure do you use for their weight? TM 55-405-9 states the following: combat-equipped soldier, 240 pounds; combat-equipped paratrooper, 260 pounds. Several units were using 200 pounds. In a CH-47, this is 1,320 pounds of weight not accounted for

through obvious signs. Do any of the following apply to you?

Manner—Are you anxious, strained, grieved, preoccupied, tense or worried? If you're troubled by any of these, you're a prime target for an accident.

Attitude—Are you, or the man who works with you, disdainful of rules and regulations? Is your can-do attitude so overbearing that you ignore safety? "Complete the mission" has become our motto. And well it should be. But this doesn't license you to jeopardize your aircraft and crew to do it.

Ignorance—Tragic accidents have been caused by lack of training, guesswork, misunderstanding, overconfidence and indifference. Unlike crime, accidents are not intentional. They're often caused by faulty behavior based on ignorance. You may feel safe in the face of danger because you don't understand the hazard.

Do you pride yourself in being able to carry a heavier load than the other pilots in your unit? If so, the inscription on your tomb may read, "Died from false pride"

As U. S. Army aviators, you've been provided with the safest equipment and materials available. In the final analysis, however, your personal safety depends on your own behavior. Safeguards are valueless unless they are used. Rules assure safety only when obeyed. Each day you face danger in your occupation. *Your greatest danger is your unsafe behavior. This is one enemy you can easily find and eliminate. When you think it can never happen to you, that's the time to watch out.*

Supervision—In the March 1970 issue of the HAWK Monthly Safety Report, BG George W. Putnam Jr., wrote: ". . . Aviation safety is a command matter. Aviation safety begins with the commander and the aircraft commander is the basic building block. . . . Action must be taken by all commanders to change the attitude that, in a combat environment, anything goes. Safety equals efficiency which equals combat effectiveness."

With this in mind, let's compare an aviation accident prevention program with a football team. We all know that a football team must work as a team with direction and guidance from the quarterback and coach. The quarterback directs the team on the field and, during the game, consults with his coach many times. In some cases, the coach must make a decision that may win or lose the game. If he makes the wrong decision and loses the game, he will do everything possible to prevent a recurrence. Game films will be reviewed, plays studied and, if needed, players shifted or replaced.

An aviation accident prevention program must also be a team effort under the direction of the aviation safety officer and the commander. Just as the quarterback directs his team under the guidance of the coach, the ASO directs the accident prevention program, guided by the commander. With this guidance, the ASO is a tremendous asset to the commander and the unit. Without it, he is an unused tool.

Chapter 16, Appendix VI, AR 95-5, provides a checklist for commanders to evaluate their aviation accident prevention efforts. Based on recent accidents, it is evident that some commanders could make very good use of this checklist.

Pilot error? *Yes—caused by a lack of command supervision and an ineffective accident prevention program.*

USAASO Sez

The U. S. Army Aeronautical Service Office discusses

Quick Tips On TERPs: The following is a brief refresher on terms and landing minimums used in connection with terminal and enroute procedures (TERPs) derived approach procedures. The three illustrations are keyed by number to the applicable lines of the example.

A decision height (DH) is the lowest mean sea level (MSL) IFR approach altitude to which a pilot may descend on a precision approach unless visual contact is made with the landing runway environment (illustration 1).

A minimum descent altitude (MDA) is the lowest MSL IFR altitude to which a pilot may descend on a nonprecision approach procedure (illustrations 2 and 3) unless visual contact is made with the landing runway environment. ILS glide slope inoperative (nonprecision) approach minimums are published on TERPs instrument approach charts as localizer (LOC) minimums (MDA) and are nonprecision procedures.

With runway visual range (RVR) inoperative determine minimums by converting meteorological visibility to RVR equivalents with RXR/visibility statue mile (SM) table found in AR 95-2 and in terminal publications.

Aircraft approach categories are based on the following factors:

APPROACH CATEGORY	SPEED/WEIGHT
A	Speed 50-90 knots, weight 30,000 pounds, or less
B	Speed 91-120 knots, or weight 30,001-60,000 pounds
C	Speed 121-140 knots, or weight 60,001-150,000 pounds
D	Speed 141-165 knots, or weights over 150,000 pounds
E	Speed over 165 knots, weight not considered

Aircraft type and series are found in FLIP Planning II.

Illustration 1. *Precision approach:* Descend straight-in to DH 1,352 feet MSL, remaining on ILS glide path. You are permitted to fly this approach with a fixed wing minimum RVR of 2,400 feet or ½ SM visibility; rotary wing—RVR of 1,600 feet or ¼ SM visibility. At 200 feet height above touchdown (HAT) (1,352 feet MSL) continue to landing if you have been cleared to land and the runway environment is sighted, or execute the missed approach.

Illustration 2. *Nonprecision approach:* Descend straight-in to 1,440 feet MSL; maintain course alignment with localizer ONLY; maintain the MDA with the altimeter. You are permitted to fly this approach with minimum RVR of 2,400 feet of ½ SM visibility; rotary wing, RVR of 1,600 feet or ¼ SM visibility. At 288 feet HAT (1,440 feet MSL) continue to landing or missed approach. (Category D minimum visibility is 1 mile or RVR 50.)

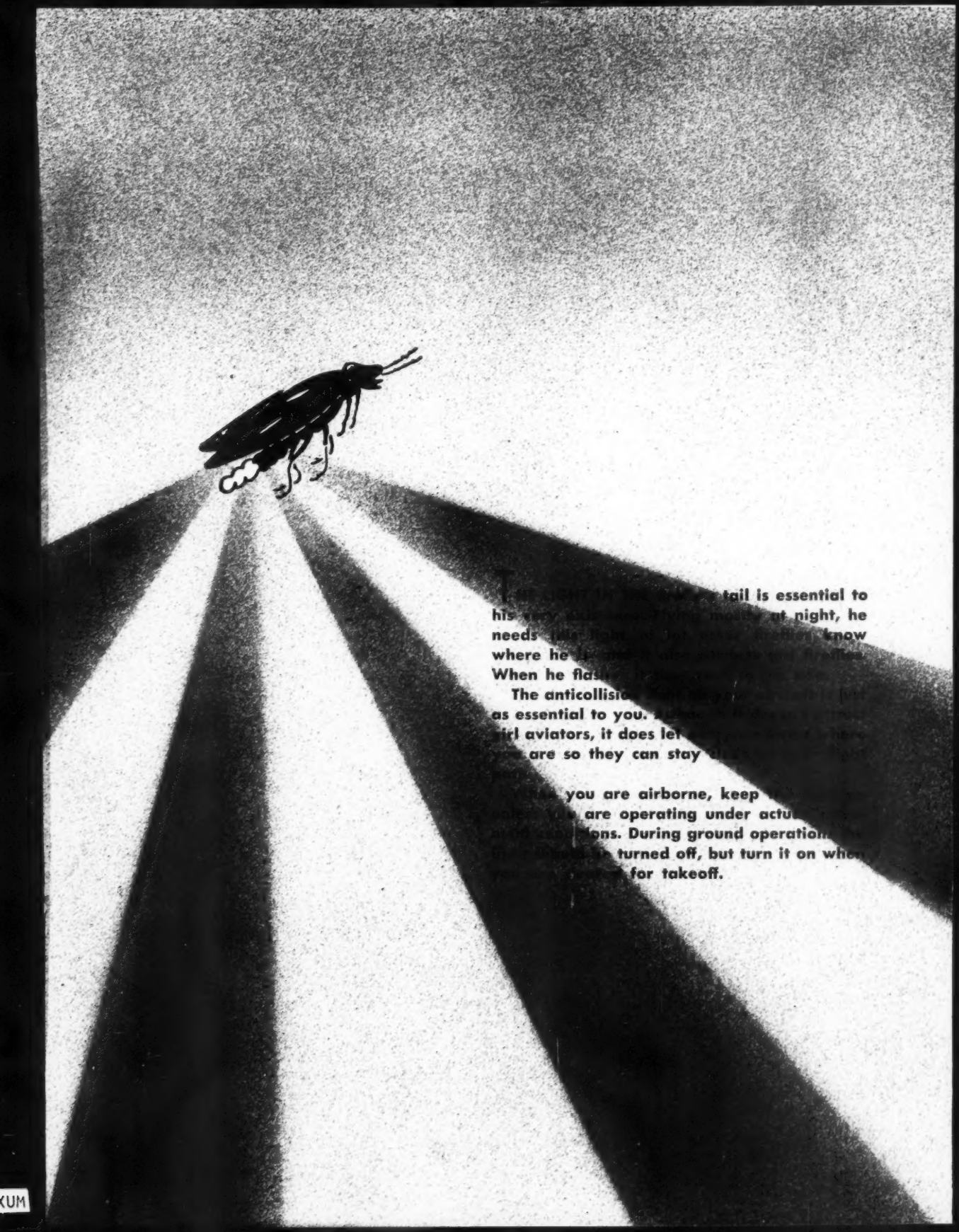
Illustration 3. *Circling approach:* (Category A aircraft): Descend to 1,540 feet MSL before commencing circling approach. You are permitted to fly this approach with minimum visibility of 1 mile (rotary wing, ½ SM) and ceiling of 400 feet (ceiling must be equal to or greater than the HAA). At 361 feet height above airport (HAA) (1,540 feet MDA) continue to a position for landing on the designated runway or execute a missed approach. Example:

FIELD ELEVATION 1,179 FEET
(Highest point on usable landing surface)

RUNWAY TOUCHDOWN ZONE ELEVATION 1,152 FEET
(Highest point in first 3,000 feet of the straight-in-runway)

		CATEGORY	A	B	C	D
Decision height	1	S-ILS-27	1,352/24	200'		(200'-½)
Minimum descent Altitudes	2	S-Localizer 27	1,440/24	288' (300-½)		1,440/50 288' (300-1)
	3	Circling	1,540'-1 361' (400-1)	1,640'-1 461' (500-1)	1,640'-1 ½ 461' (500-1 ½)	1,740'-2 561' (600-2)

Be completely familiar with all flight operating rules in FAR 91 and the amendments and other rules contained in AR 95-2.



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KUM

correct way for TAKING OIL SAMPLES

You'll need plastic tubes. They must be kept clean by using plastic caps or crimping both ends. You'll also need small bottles with blank labels. The sample bottle recommended by TB 55-6650-300-15 is a 5-dram pill bottle with a plastic screw cap, FSN 8125-933-4414.

two methods for taking samples are

DIPPING TUBE INTO OIL AND PLACING FINGER OVER TOP, CAUSING AIR LOCK TO HOLD OIL

AND

DRAWING OIL BY MOUTH

The important thing is to avoid contaminating the oil—the lab can't get a true reading if the sample is contaminated. Be sure to label the sample giving these details: where oil is taken—sump, aft transmission, etc.,—and aircraft type and serial number.

PREPARED BY THE UNITED STATES ARMY BOARD FOR AVIATION ACCIDENT RESEARCH.

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